

SEPTEMBER

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POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD. TRADE MARK, GREAT BRITAIN, NO. 460421

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SEE PAGE 420



This MAGIC DISC Pays You up to \$30 and more Daily

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The "Magical" LUX WATER HEATER has broken all records for tremendous sales. Its breath-taking, dynamic action proves itself before your prospect's eyes. Simply plug in light socket—anywhere—and instantly you have scalding, boiling hot water for shaving, bath, laundry, washing dishes, cooking, illness or for any need. You can sell dozens in a few hours!



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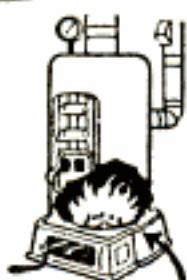
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Costs Only a Few Dollars

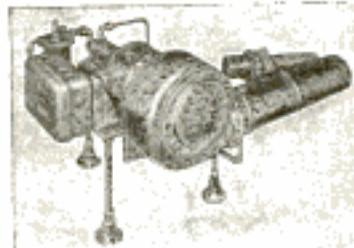
International Oil Burners heat just as well as burners costing \$400 or \$500. Simply turn 1 valve and you have all the heat you want. Cleaner and better for heating or cooking. Approved by the National Underwriters' Laboratories and engineers everywhere. Over 150,000 have been sold.

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Removes Dirt and Filth Instantly

HERE'S the article that everyone has been looking for. Just imagine a device that filters drinking water instantly at the faucet! In half an hour it removes enough dirt and suspended materials to cover the bottom of a glass. You can actually see the difference in the water!

Makes Drinking Water Cleaner, Tastier and More Wholesome

This amazing invention shows you in a few minutes why it should be on your faucet—shows you how much dirt it collects—shows you why not to drink unfiltered water. Drink lots of water every day, medical men advise—but be sure it's clean.

You filter the oil and gasoline that goes into your car—why not use the same care in filtering the water you drink?

The Automatic Water Filter on your faucet is almost like bringing a bubbling spring into your kitchen. It uses Nature's method by filtering through millions of grains of sand. That's why it delivers sparkling water, pleasing to the taste, more wholesome.

Costs so little, everyone can afford it. Saves buying spring water. Pays for itself. You will never be without it once you have used it.

"Just Like Spring Water"

"I have one of your Filters and we sure like it and would not want to do without it again. It makes the water look sparkling clear, just like the spring water I used to drink from the mountains." JACOB FOEHL, Michigan.

"Water Tastes Better"

"The Automatic Water Filter does an excellent job. I tested it on my faucet and when I cleaned it, I found about a teaspoonful of mud, slime, decayed vegetation, rust and filth. The water filtered through the Automatic actually seems to taste better. It certainly looks clean." ROBERT LINCOLN, Massachusetts.

Dirt & Slime Found by Chemist's Test



Here is what the chemist reports:

"It is amazing how much dirt the Automatic Water Filter takes out of city water at the faucet. After a two-hour test enough foreign material, dirty brown in color, with a fishy odor, was removed to fill a teaspoon." —Sommer Chemical Laboratories.

GUARANTEE

Why continue drinking dirty, unfiltered water when it is so easy now to filter your water clean, at the faucet. It makes no difference where you live or what kind of drinking water you have, the Automatic Water Filter will remove dirt from it and deliver sparkling clear water, or the trial costs you nothing. Prove it yourself—try it on your own faucet at home at our risk.

AGENTS & SALESMEN! Make Up to \$100 a Week

We have arranged a plan that makes it possible for agents to start immediately, making big money with the Automatic Filter. Good territory still open.

Robert S. Jo sold 17 Filters in 2½ hours! A. P. Pelletier made \$52.50 in 4 hours, a profit of over \$13.00 an hour. The same opportunity is open to you.

Our plan enables those who are really interested, to obtain their sample free.

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more popular
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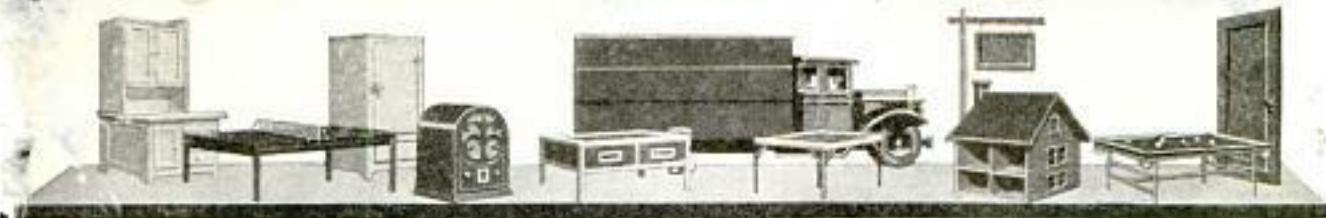
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SUCCESS

*while you are young enough
to enjoy it!*

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But why look with envy upon success well earned—especially when it is within your power to attain that same success?

"If young men in business only realized how immensely valuable are those early years, and how vital it is to get away to a flying start, they would make it an inflexible rule to devote several evenings every week to home-study business training."

One of America's foremost business men—an active director in a dozen big corporations—made that statement recently; and if you have the slightest doubt of its truth, you need only check it by the actual records of LaSalle-trained men, many of whom, though still in their thirties, are commanding five-figure salaries.

**TWO who achieved success early
—and one who waited***

For instance—"I'm not going to be a \$100 a month clerk all my life," said R. P. at 20—and today he is one of the nation's outstanding accountants although not yet thirty-five years of age.

R. E. was a clerk in the purchasing department of an Illinois factory—drawing \$16 a week. Last year, his income was close to \$20,000 and he is still under 40.

*Names gladly given on request

On the other hand, C. J. F. at forty-seven was earning only \$200 a month—six years later, thanks to LaSalle training, his income was over \$10,000. Is it any wonder that he urges others to do early in life what he waited so long to do?

"TEN Years' Promotion in One"

"I'm determined to succeed," you say—and we do not deny that hard work and learning through day-to-day experience will eventually win you some measure of success. If success is sweet, however, is it not doubly sweet if it comes to you while you are still young enough to enjoy it?

And is it not a needless and tragic waste of years to continue at out-grown tasks, simply because you will not spare yourself the time to master those bigger jobs that command the real rewards?

"Ten Years' Promotion in One" is a booklet that shows you how you can save years that might otherwise be wasted. Sending for it has marked the turning point in the lives of thousands upon thousands of men—and the coupon will bring it to you FREE.

With this book we will send you, without cost or obligation, complete particulars of the training that appeals to you, together with our easy-payment plan.

Will you wait till the golden years of your life are fast slipping away—or will you set your path toward success while you are still young enough to enjoy it?

Prove that you mean what you say when you say that you want to get ahead—by what you do with this coupon NOW.



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Without Capital



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National Radio Institute

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Made \$700 in 5 Months Spare Time
"Although I have had little time to devote to Radio, my spare-time earnings for five months after graduation were approximately \$700 on Radio sales, service and repairs. I owe this extra money to your help and interest. Thanks for the interest shown me during the time I studied and since graduation." — Charles W. Lindsey, 537 Elati St., Denver, Colo.

\$7346 Business in two and one-half Months

"I have opened an exclusive Radio sales and repair shop. My receipts for September were \$3,332.36; for October, \$2,887.71, and for the first half of November, \$2,174.32. My gross receipts for the two and one-half months I have been in business have been \$7,394.25. If I can net about 20 per cent this will mean a profit of about \$1,500 to me." — John F. Kirk, 1514 No. Main St., Spencer, Iowa.

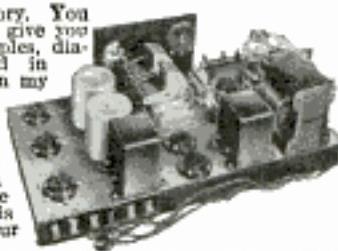
My Free book gives you many more letters of N. R. I. men who are making good in spare time or full time businesses of their own



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You will get Extensive Practical Radio Experience with my Home Experimental Outfits

My course is not all theory. You use the Eight Outfits I'll give you in working out the principles, diagrams and circuits used in modern sets and taught in my lesson books. This 50-50 method of home training makes learning easy, fascinating, interesting. You get as much practical set servicing experience in a few months as the average fellow who hasn't had this training gets in two to four years in the field.



Get the facts on my Lifetime Employment Service to all Graduates

The world-wide use of receiving sets for home entertainment and the lack of well-trained men to sell, install and service them have opened many splendid chances for spare-time and full-time businesses. Besides Radio's growth is opening hundreds of fine jobs every year. "Rich Rewards in Radio" gives detailed information on these opportunities. It's FREE.

So many opportunities many make \$10 to \$25 a week extra while learning

Many of the ten million sets now in use are only 25% to 40% efficient. The day you enroll I will show you how to do 28 jobs common in most every neighborhood for extra money in your spare time. I will show you the plans and ideas that are making as high as \$200 to \$1,000 for others while taking my course. G. W. Page, 2210 Eighth Ave., S., Nashville, Tenn., writes: "I made \$935 in my spare time while taking your course."

Many \$50, \$60, and \$75 a week jobs opening in Radio every year

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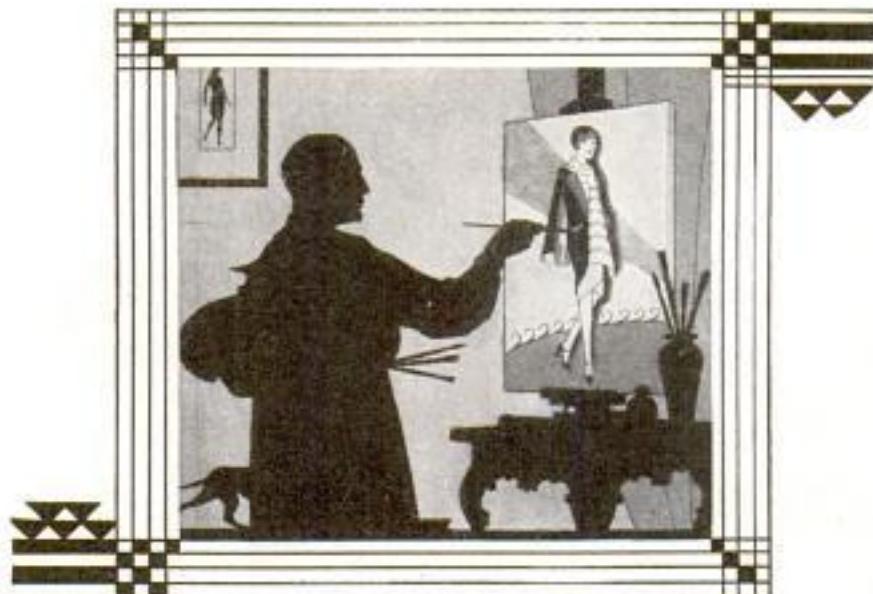
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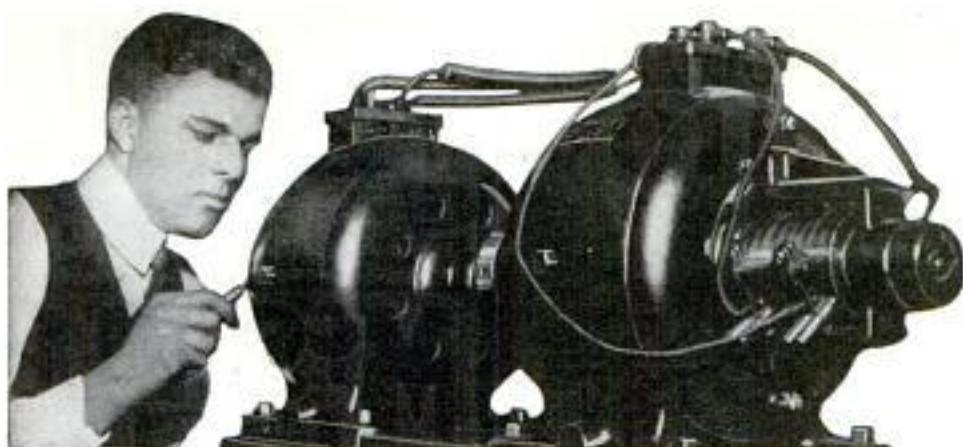
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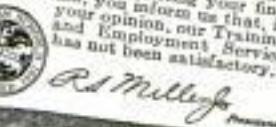
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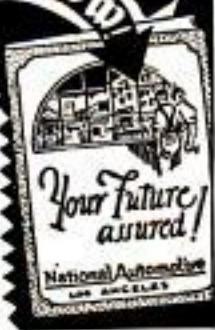
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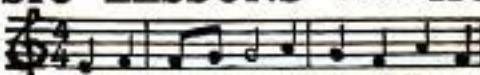
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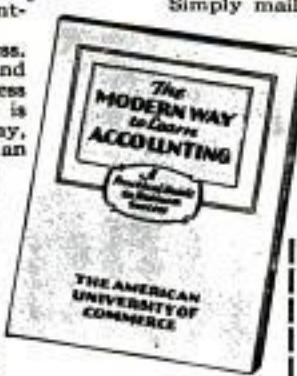
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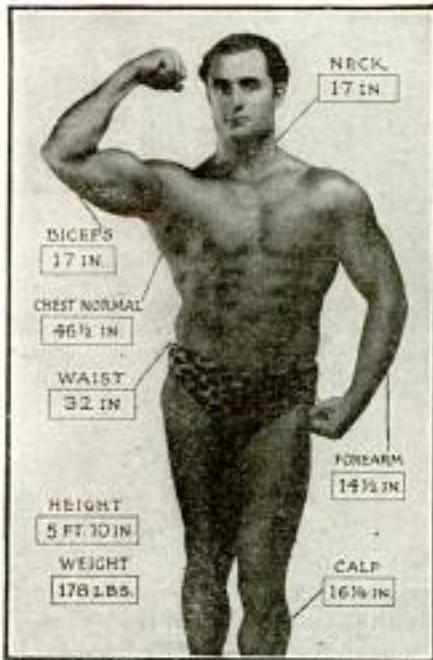
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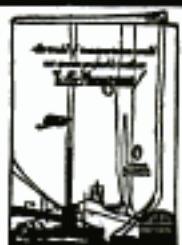
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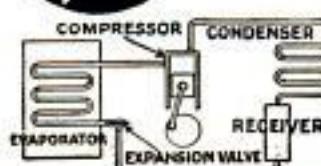


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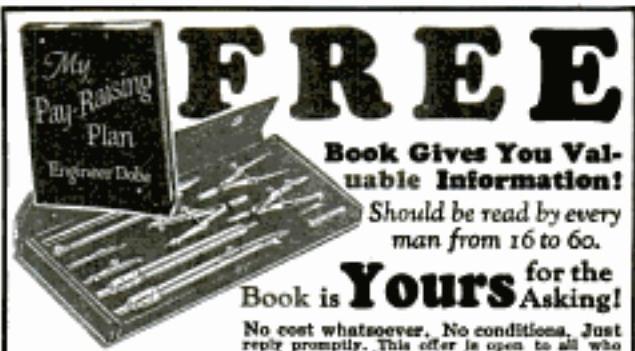
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AMATEUR Cartoonists: Sell your work. Write Smith's Service, PW1194, Wenatchee, Wash.

INDEPENDENT Business—men earn big pay traveling by automobile carrying our portable electric block leveling machine and re-leveling butchers chopping blocks. Heath Company, 210 Lafayette St., New York.

DOLLARS In "Fixit" service, spare or full time. Small capital. Experience unnecessary. Complete copyrighted 43 lesson instruction course, \$1.00. Particulars free. Houkate's "Fixit" Service, 1305 N. El Molino, Pasadena, California.

POPCORN Machines \$15 up. Money makers. Northwides Co., 1306 Fifth, Des Moines, Iowa.

MIRRORS Resilvered at Home. Costs near 5 cents per square foot; you charge 75 cents. Profitable business plating like new brassy, worn-out autoparts, reflectors, tableware, stores, etc. Outfits furnished. Details Free. Sprinkle, Plaster, 127, Marion, Ind.

250,000 ARTICLES Wholesale. Directory 10c. W. Patterson Co., 4111 University, Des Moines, Iowa.

"**TIMELY Tips**" money-making ideas! Plans? Opportunities! Three samples 25c. Elite Magazines, 1821 East 101st, Cleveland, Ohio.

SUCCEED With your own products, make-sell them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

WE Start you in business, furnishing everything. Men and women, earn \$40 to \$100 weekly operating our original "New System Specialty Candy Factories." Begin home spare time. Unlimited opportunity. Valuable booklet free. W. Hillier Ragsdale, Drawer 4, East Orange, N. J.

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SELL By mail. Books, novelties, bargains! Large profits. Particulars free. B. Elfre, 525 S. Dearborn, Chicago.

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BIG Pay and a great future selling world famous Public Service shirts, ties, hose, underwear, week shirts, etc. Cash commissions paid in advance. Also liberal cash and merchandise bonus, also promotions to district manager positions paying up to \$7,000 yearly. We furnish everything free, and supply sales help. Write immediately for complete scientific selling outfit free. Public Service Mills, Inc., Dept. 219, West New York, New Jersey. Canadian agents write: 110 Dundas St., London, Ontario, Canada.

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AGENTS—New ideas for increased incomes; successful plans; inspirational suggestions; unusual money-making opportunities contained in new large "Outdoor Selling Magazine." Rush request! Outdoor Selling, 11 West 42nd, New York.

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\$2 TO \$4 Per hour easily made. Nothing ever sold compares with the sale of Christmas Greeting Cards in box assortments. Our 1931 assortment beats all our former triumphs, contains 21 composite cards and folders, dainty water colors, steel engravings, embossing, glistening gold metallic effects, tipped-on illustrations, parchment and deckled-edge folders, each with tissue lined envelope. Sells for \$1. Costs you 30¢—shipping charges paid. Write for particulars and free samples. Waltham Art Publishers, 1 Water St., Dept. 98, Boston, Mass.

100% PROFIT In new mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50¢. Sample and sales plan 25¢. New Method Manufacturing Co., Box PM-9, Bradford, Pa.

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BIG PROFITS Selling Groceries. Motor Oils, Paint, Stock Minerals. Sample Case free. Lucifer & Browne, 1602-U So. State St., Chicago.

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STEP Into big money with Work Clothes. Every man needs Pants, Breeches, Coveralls. Longwear's 4 complete lines sell on sight. Cash in your pocket every day. Belt free with every 3 Complete outfit Free. Dept. P-9, Longwear, 489 Bromel St., New York.

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NEW Invention makes any clock electric. Easily attached. Big Profit. Bestever Clock Co., 4319-P Irving Pk., Chicago.

300% PROFIT In new "20-in-1" kitchen necessity. Retail 25¢. Costs you \$1.00 a dozen. \$10.00 a gross. Sample 15¢ to cover cost of mailing. New Method Co., Nu-Method Bldg., Dept. PMM-9, Bradford, Pa.

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WE placed 5,000 men in good paving jobs, selling Shirts, Ties, Underwear, Hosiery, Workshirts, Lumberjackets, etc. I'll give you a marvelous outfit free. Remarkable values get orders and repeats. Big cash commissions and bonuses. Write Dept. H-9, Quaker, 1107 Broadway, New York.

300% PROFIT Selling Mystery Gas Lighter. Retail 25¢. Costs you \$1.00 doz. Sample free. Square Deal Mfg., Dept. PM-25, Bradford, Pa.

ELECTRIC Water heater—New. Heats water instantly. Pocket size—retails \$3.75. Two minute demonstration makes you \$1.95 profit. Lux-Visel, Dept. 97, Elkhart, Ind.

NEW Radio offer. Pentode a. c. Specialty. Agents raking money. Free details. Radio Reporter, 20 Merchandise Mart, Chicago.

NEW Rubber goods line. 47 money makers. Rubber rugs, cushions, bath mats, raincoats, rubber soles, aprons, baby goods, etc. Big profits, best values. Direct from Akron, the Rubber City. Make up to \$90 weekly. Credit given. Write for catalog and free outfit offer. Kristes Mfg. Co., 1439 Bay St., Akron, Ohio.

"POLOX." The original, trademarked "Fluid Solder," repairs radiators, gasoline lines, tanks, furniture, dishes, etc. See article page 185 August issue Popular Mechanics. Secure agency genuine article. Polar Mfg. Co., Merriam, Kansas.

BIG PROFIT catalog: toilet preparations, food products, remedies, household specialties, portraits, frames, medallions, Christmas cards. Credit. James Bailey Co., Station C-9, Chicago.

AMAZING New electric razor! Revolutionizes shaving! New everywhere! Wildfire seller! Enormous profits! No competition! Contract! Outfits! G. R. Co., L. I. City, N. Y.

NEW Booklet shows the way to get jobs that pay. 10¢. Satisfaction guaranteed. Mapubco, 3565 Seabreeze Station, Daytona Beach, Florida.

WONDERFUL Powder shakes from can, removes anything from hands without injuring skin; everybody buys; big repeater; opportunity for hustler. Sample free. Cowell, 804B Grand, Kansas City, Mo.

ADDRESSES—Hundreds of wholesale agent supply houses. Particulars. J. Bellfort, 4042 N. Keefer, Chicago.

AGENTS—Anywhere—Answer these questions—Can you sell my new "Charm" Wrench? Self-adjusting, best ever devised. Can you finance your virgin territory? Address Prudiron, Williams Building, San Francisco.

SELL THREADING NEEDLES and USA needlethreader. Samples, each 10¢. Agents protected. Box 485 City Hall Sta., New York.

SELL Goodyear raincoats. \$2.95 up. Goodyear Rainwear, 18 West 22nd, New York.

BIG MONEY EASY. Simply showing New Polly Wrench. 10 wrenches in one. Guaranteed fast seller. Sample furnished. Gellman Manufacturing Co., Dept. 9-G, Rock Island, Ill.

SELL Personal Christmas cards. Names embossed in gold. Lowest prices, highest commissions. Samples free. Also box assortments. H. Dunbar Co., New Brunswick, N. J.

MAKE Up to \$15 daily introducing men's, women's, children's finest hosiery. Warrented 6 months or replaced. Amazingly low prices. 126 styles, colors. Auto and hosiery given producers. Write quick! Wilkitt Hosiery Co., C-379 Midway, Greenwich, Ill.

MAKE Big money selling sensational instant electric water heater. Every home welcomes it. \$30 a day cash pay easy. Send \$1.00 for sample and free selling plan. Regent Electric Works, 8444 South Chicago Avenue, Chicago, Ill.

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AUTOMATIC Clear gas lighters. No friction. Sample 25¢. Gas Lighter Co., St. James St., Montreal, Canada.

MARVELOUS New Water Heater, heats water instantly. Pocket size. Retail \$3.75. 2 minute demonstration pays up to \$2.25 profit. Special sample offer. Soiray Company, 213 East Illinois, Dept. 400, Chicago.

IF You want a wonderful opportunity to make \$13 profit a day and get a new Ford sedan besides, send me your name immediately. No experience necessary. Particulars free. Albert Mills, 9137 Mennouth, Cincinnati, Ohio.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

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AGENTS. Build a volume repeat business in your territory with nationally known Auto-Beauty Kit. Fast seller, big profits. State previous selling experience, territory covered. U. S. Mfg. Corp., Dept. A, Decatur, Ill.

250,000 ARTICLES Wholesale—Directory 10c. W. Patterson, 4111 University, Des Moines, Iowa.

SOMETHING The housewives want. A signed guarantee to save money and time in cooking. No competition. 400% profit. No license required. Station C, Box 25E, San Diego, Calif.

MIRRORS Resilvered at Home. Costs near 5 cents per square foot, you charge 75 cents. Profitable business pasting autoparts, reflectors, tableware, stores, refinishing met-alware, etc. Outfits furnished, details free. Write Sprinkle, Plater, 128, Marion, Ind.

SIGN Salesmen let us tell you about a New Changeable Sign that sells for \$1.50 and gives you 400% profit. National Sign System, St. Louis, Mo.

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PHOTO MEDALLIONS. Send for latest catalogue. Hundreds of our newest designs. Photo novelties. Lowest prices. Quick service. Medallion Novelty Co., Inc., 208 Bowery, New York, N. Y.

THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

AGENTS For handick; original powdered handsoap. Approved Good-Housekeeping. Everybody customer. Fine opportunity for hustler. Sample free. Solar Products, J-2144 So. Troy, Chicago.

SUCCEED WITH your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

AGENTS—Engraved name plates, signs, number plates etc., easily sold with large profits. Brett Bros., Winstrop, Mass.

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BIG MONEY applying gold initials on automobiles. Easiest thing today. No experience needed. \$1.45 profit every \$1.00 job. Free samples. "Bales," X-1043 Washington, Boston, Mass.

NEW Line Counter Displays. Aspirin, Flinis, Chewing Laxative, Breath Gum, Not-tar, Silktone, etc. Steady Repeats. Over 100% Profit. Superba Co., W5, Baltimore, Md.

THIS Advertisement may make you thousands of dollars. If you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes; moneymaking information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. Dr. Lacombe Miller, Chemist, Tampa, Fla.

CHICAGO Expert valued \$3 stone at \$300. The diamond's only guaranteed rival. Greatest spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. Mexican Gem Company, Dept. P.M., Monterey, Calif.

FREE "Booklet of money making opportunities," new ideas, original plans, money making secrets and other valuable information. None require peddling or outfit. Elite Co., 81 Elizabeth St., New York.

SELL 3A Garage door holders, simple, automatic, quickly installed. Interests garage owners, builders, everybody. Exclusive territory proposition. Knowlson-Stevenson Co., Ann Arbor, Mich.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950 W Broad, Richmond, Va.

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CALIFORNIA Perfumed beads, selling like hot cakes. Agents coining money. Catalog free. Mission Factory, P. 2328W Pico, Los Angeles, Calif.

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WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 641, St. Louis, Mo.

AGENTS—Make a dollar an hour. Sell Mendots, a patented patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

PHOTO Medallion men and women, the largest line of photo novelties in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. Gibson Photo Jewelry Co., Inc., 833-837 Gravesend Ave., Brooklyn, N. Y.

A BUSINESS Of your own—Making sparkling glass name and number plates, checkerboard signs. Big book and sample free. E. Palmer, 512, Wooster, Ohio.

SELL Stores 5c carded breathlets, etc. Larras Products, Albany, N. Y.

AMAZING Electric water heater. Pays big profits. Heats water instantly. Pocket size. Sells fast at \$2.95. Write quick. Bestever Co., 4317P, Irving Park, Chicago.

AGENTS—Clever invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

AGENTS Everywhere making money with our line of kitchen specialties, demanded in all homes. Big earnings possible. Write today for details. P. Seed Filter Co., 333 Broadway, New York.

SELL Men's neckwear—wonderful proposition. Astor-M, 39 East 28th, N. Y.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 49-T West VanBuren, Chicago.

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AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address, 25¢, Stamping outfit. Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

MAN In each town to paint auto parts, reflectors, bathroom fixtures, refurbish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

GREATEST Opportunity; newest proposition. Build continually paying business in your own name. Household, industrial, brushes, brooms, mops, dusters, fully guaranteed. New catalog, all net prices, no discount to bother with. Make as high as 300 per cent and over. Write today. Wire Grip Sanitary Brush Corp., 41 East 11th St., New York.

HIGH-GRADE SALESMEN WANTED

EARN \$1000 Between now and Xmas. Your friends, relatives, neighbors will buy on sight. Because Process 1931 Famous Artist Line of Christmas Greeting cards, imprinted with sender's name and message, costs no more than ordinary cards. Big cash commissions paid in advance, monthly cash bonuses, etc. Write for complete outfit free and confidential sales plans. Process Corp., Dept. 802-C, 21st at Troy, Chicago.

WANTED Salesmen calling on mechanical lines to secure orders for small metal stampings on commission basis. Send full particulars. Otto Konigslow Mfg. Co., 3510 Perkins Ave., Cleveland, O.

\$5000 A YEAR Opportunity calling on merchants and banks. Clever "Animated Advertising Display" creates instant sales appeal. Minimum investment of \$225 required with immediate liberal profit return. Character Display Co., 3249 N. Herndon Ave., Chicago.

SALESMEN, Advertising thermometers, pencils, book matches, calendars, Christmas cards. Full sample line \$2.00. Refunded. No catalog, sell from samples. Order your kit now. Box 42, Carlsbad, N. J.

MAKE Money every day; establish agency selling men's All Wool Suits, Topcoats, Overcoats, below \$20.00. Pays you \$4.00 each every order. Beautiful selection, easy to sell. Expensive outfit, sales help free. Write experience. All Wool Clothes, Dept. P, 880 Broadway, New York.

SO GOOD, It's foolish to call this selling. Men must buy shirts, ties, underwear, hose, other necessities. Rosecliff's powerful year guarantee makes big money for you. Cash bonuses, free shirt offer. Finest outfit free. Write today. Dept. L9, Rosecliff, 1237 Broadway, New York.

WORLD'S Greatest selling article, just out. Over 5 million waiting to buy now. Season starting. Big commissions. Chicago Cutting Co., 2333-A Nelson St., Chicago.

SALESMEN—New trade stimulator. Beautiful junior automobile 6 feet long furnished free to merchants. \$15. commission each \$5. sale. Drimmer, 927 Broadway, New York.

EVERY User of the mails needs an envelope sealer. The Kendall seals fifty minute. Retails \$2.50. Big profit. Good territories available. Kendall Sealer Company, Dept. 5, Berkeley, Calif.

RECORD Breaking profits selling stores amazing new business stimulator. Low cost. Unusual features. Retailers buy on sight—repeat often. Commissions in advance. Outfit free. General Premium, 66-T, East Lake, Chicago.

\$18 TO \$25 DAILY; biggest selling line of men's suits. Meets present day conditions. Amazing values at \$11.95, \$14.50, \$16.95, \$18.95. Also raincoats, slickers, topcoats and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State age and selling experience. "Jim" Foster, Inc., Dept. 29, 2230 South Spaulding Ave., Chicago.

\$60 WEEKLY Easy! Selling amazing value all wool 2 Pants Suits \$21.95, \$5 profit. Single Pants Suits, Topcoats, Overcoats \$18.95. Union tailored. Sample suit for producers. Outfit free. Williams Bros., 879 Broadway, Dept. WH-32, New York.

CLOTHING Salesman—Sell wool suits. Three piece, made to measure, \$12.50. Commission \$2.50 in advance. Also top coats same price and commission. Harper Mfg. Co., Rome, Ga., Dept. A-1.

\$85 WEEKLY—Easy. Selling men's made-to-order suits at \$21.50. Build a permanent and repeat business with our guaranteed clothes. New selling method. Part or full time. Liberal commission and bonus. Free suit offer to beginners. Free outfit. 20th Century Tailoring, Aurora, Illinois.

GET Something that really sells. Auto seat covers \$1.95. Write today. Colorzone Company, Des Moines, Iowa.

GOOD Steady money maker. Exclusive territory to workers. Much needed automobile signal. Pronounced best and most fool-proof by president America's largest auto association. Get particulars and make money. You Auto Signal Company, Dept. A, Fort Lauderdale, Florida.

ONE \$5.75 order daily means \$100 weekly on our guaranteed money back sales promotion deals. Free kit. Sales Stimulators, Dept. 14H, 311 Madison, Chicago.

WANTED County salesman with car, to demonstrate for large Ohio manufacturer. First class job. Fyr-Fyer Co., 2185 Fyr-Fyer Building, Dayton, Ohio.

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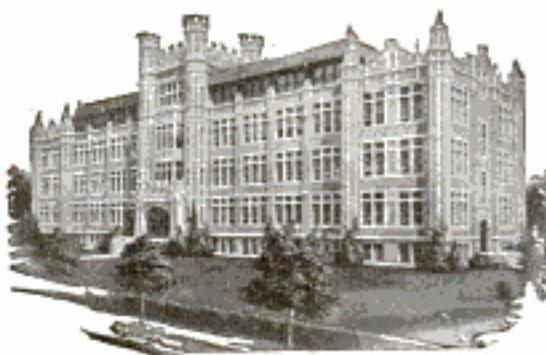
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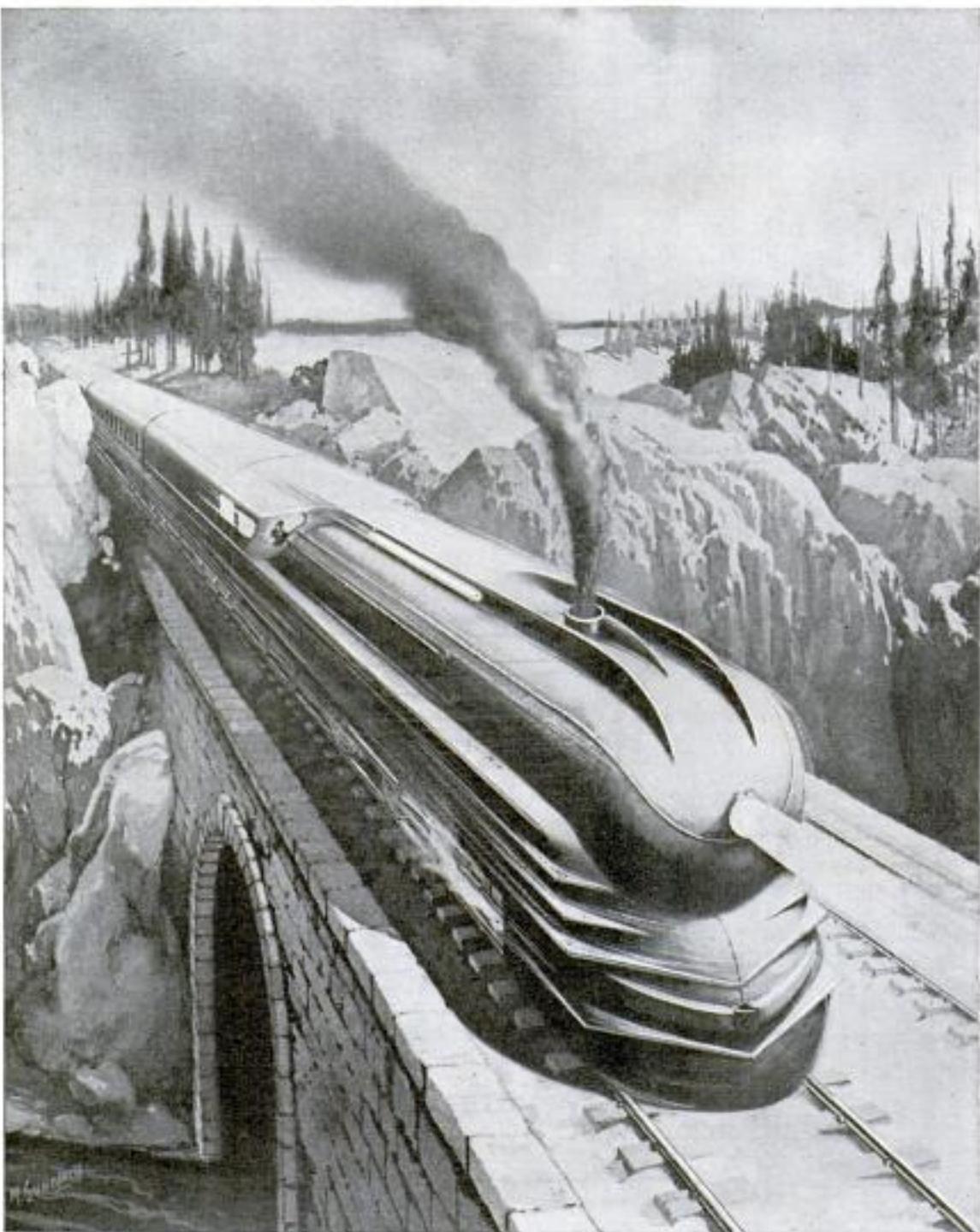
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'Old Iron Horse' Touched by Beauty's Hand



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Pat. pend.

Otto Kuhler, design engineer and the "father of streamlining," has drawn plans for a beautiful new type of railway engine that is expected to combine a thirty-eight-per-cent increase in efficiency with its esthetic appeal. By streamlining the entire locomotive-and-tender assembly, as

shown above, and using duraluminum or other aluminum alloy for a majority of the metal parts, the weight can be reduced by half. This would provide much higher speed, yet at a cost not exceeding present figures. It would decrease upkeep costs on the roadbed as well.

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 56

SEPTEMBER, 1931

No. 3

Into the East and Out of the West, Around the World

What Aviation Needs

HATCH FOLDS INTO WIND SHIELD

TAKING AN OBSERVATION WITH BUBBLE SEXTANT

RADIO SET

SPERRY HORIZON SPERRY DIRECTIONAL GYRO

MULLIGAN SYSTEM FOR EXCHANGING NOTES PILOTS PERIODIC COMPASS

FUSELAGE TANKS

DIRECTIONAL GYRO VENTURI IN SURSTREAM

PILOT'S SEAT

PILOT'S RESTR.

international

HOW about a trip around the world on your two weeks' vacation? Ask Wiley Post and Harold Gatty, who have flung a girdle around the globe in just eight days, fifteen hours and fifty-one minutes—a forecast of future air travel.

Magellan's 1,125-day world tour has shrunk to less than nine.

Wiley Post lost an eye in an oil-field accident in Oklahoma. That gave him \$2,000 compensation, and his first airplane—the start of his flying career.

Harold Gatty trained in the Australian naval academy as a navigator. He served in the merchant marine and then opened a school. Of his ability

Colonel Lindbergh remarked: "He is one of the greatest navigators in the world."

It may seem a simple thing to pilot an airplane across the ocean since steamers go with such regularity. But taking observations from a liner and "shooting the sun" from an airplane averaging 100 miles an hour are quite different jobs. The position of the plane changes so rapidly that the reckoning becomes most difficult. So, while the adventure offered a daring challenge to both men and aircraft, above all it gave a decisive test to the instruments by which men steer across seas and continents.

And what are the re-

SCIENCE AND INVENTION,
a magazine long and favorably known, has been merged with Popular Mechanics. Beginning with this issue, Science and Invention subscribers will receive this magazine each month until their subscription expires. Those who have been subscribers to both will have their subscription to Popular Mechanics extended by the number of months of Science and Invention still due. We welcome our new readers with the hope that they will grow to like this magazine as well as they did the other. All contests and offers conducted by Science and Invention have been discontinued.



sults? First, that the instruments and mathematical tables used in determining position need improvement; second, that the radio equipment was so much dead freight. But if the instruments and tables used in determining position were at fault, the bewildering array of illuminated needles, figures and dials on the dashboard acquitted themselves splendidly. Post had before him devices for measuring his distance from the earth, his velocity with reference to both the atmosphere and ground objects, motor temper-

ature, oil pressure—in short, he had a whole staff of sleepless reporters working for him.

Only a pilot knows what a pea-soup fog means. A few hundred miles off the coast of England, and the "Winnie Mae"

flew blind at an altitude of 12,000 feet. It was daytime, but it might just as well have been night. Gatty watched for every crack in a cloud to get a sight. And Post held the ship true to the course of the compass.

Between Berlin and Moscow, a 925-mile land hop, they encountered the dir-

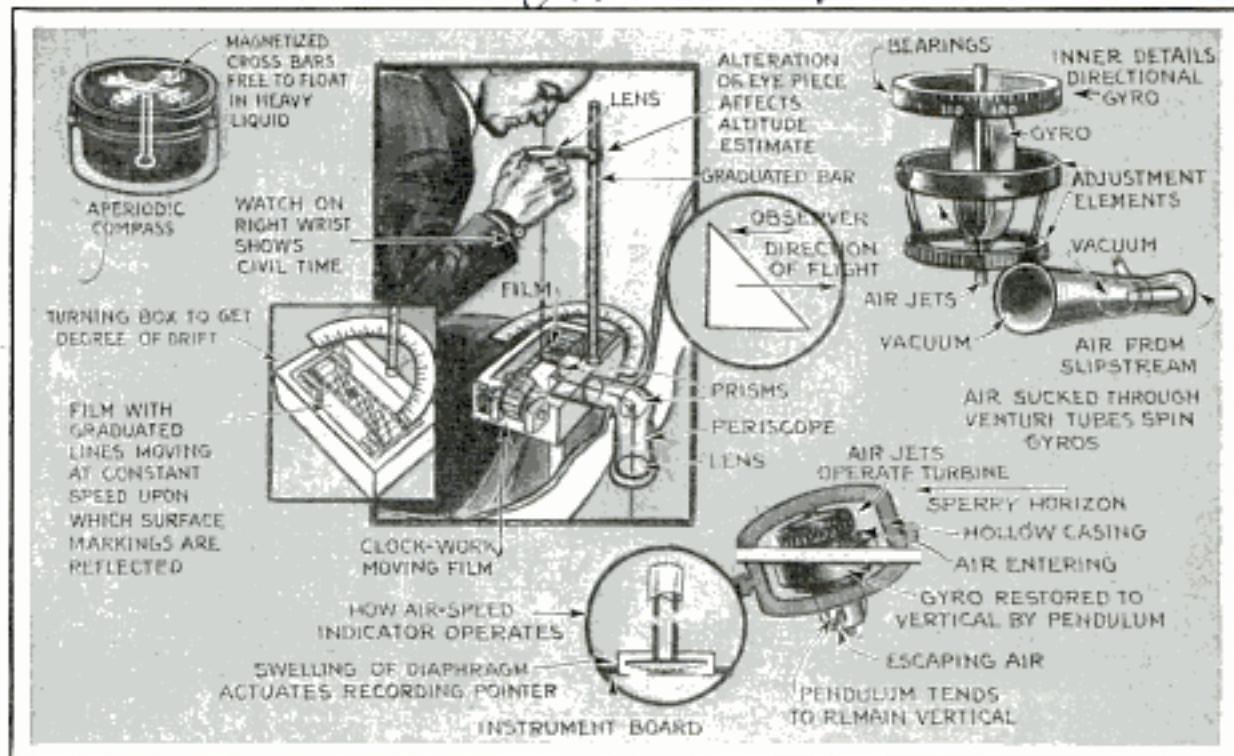
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POPULAR MECHANICS

Brookline, Mass

355



tiest flying on their entire journey. The ceiling pressed down so close that they were forced to fly just above the tree tops. Landmarks flew by so swiftly that they were unable to check their course. Here Gatty's drift indicator came to assistance. It corrected the shift in flight direction caused by cross winds. With the aid of that sense called "dead reckoning," Post struck Moscow square on the nose.

In eastern Siberia they traveled over a strange and hostile wilderness where again they almost scraped the trees, and their hearts leaped as strange apparitions loomed out of the eerie mist. Several times, they pulled the "Winnie Mae" up sharply, and here it was their Sperry horizon which saved the expedition.

They started across the Sea of Okhotsk just before darkness; and as it began to rain, the fog thickened, and for four hours no outside object could be distinguished. Every instrument on the dashboard became vital, since the aviator's tools were useless. Over the Bering sea they flew blind through more dense fog.

Among Post's most dependable instruments was the Sperry directional gyro which indicated the "Winnie Mae's" compass course. Unlike the magnetic compass, it does not oscillate in turns or in rough air. When used in connection with

the horizon, the directional gyro allows the pilot to perform all essential maneuvers without seeing outside the ship. The value of the horizon in blind flying cannot be overestimated. Its chief function is to correct the errors of our senses when judging position in space. Man relies on three special senses to determine his position in space: The eye places him with reference to the horizon line; the inner ear maintains a sense of equilibrium by means of a tiny liquid level, and the feel of his own weight sometimes tells him which is up and which down.

Experience proves that if the eyes are blindfolded, the inner ear and our sense of weight cannot define the horizontal for us. When a pilot makes a climbing turn, his notion of vertical is really a forty-five-degree line. Hence, the need for an instrument to define the horizon at all times. The Sperry horizon provides the pilot an exact picture of himself with reference to the earth's horizon. If his plane's nose is pointed above the natural horizon, he sees a tiny model of an airplane with its nose pointed that way. If he dives, this tiny plane drops below the instrument's horizon; if he banks, the tiny wings are shown tipped. The turn indicator also proved a valuable blind-flying instrument. It enables a pilot to steer a straight

course when the compass cannot be relied upon. It is not affected by rolling or pitching, but indicates the least motion about a vertical axis.

Gatty, with Lieut. Commander Philip Weems, U. S. Navy, has devised new methods for determining position by celestial aviation. Their system employs an aero-chronometer and a bubble sextant. With a bubble sextant, one need not depend upon the horizon, but uses instead the sun and the stars. And the aero-chronometer, worn on the wrist, is intended to overcome the difficulty that airplane speeds place on the aviator. It is easy to remember the exact time at sea where motion is sluggish, but in flying at high speeds a great error is introduced. The aero-chronometer is a mechanical check on the exact instant of observation.

Although the "Winnie Mae's" radio proved of little help, Gatty believes that

radio can be made as useful to aircraft as it is to seacraft. He made repeated attempts to signal with his short-wave transmitter, but no one is reported to have detected his letters. And the receiver was almost as useless, since the only weather reports it picked up were in Russian, which he could not understand.

One of Gatty's chief pleasures was testing his own invention of a ground-speed and drift indicator, combined into one instrument. Across the Atlantic the "Winnie Mae" drifted as much as nineteen per cent. The instrument won his confidence.

Gatty's invention consists of an endless film cut across by fine parallel lines. This strip of film moves at a speed synchronous with that of the plane over the earth. The aviator looks through a periscope and makes his observations of the ground. He found the device quite satisfactory, but intends to refine it further.

not on market

TEN THOUSAND HOLES AN ACRE PREVENT SOIL EROSION



Plow Which Prevents Soil Erosion by Leaving a Field in Alternating Hills and Hollows

*Q 152
of soil erosion
especially of tillage? Name
of soil specialists
Dept. of Agriculture*

A farm implement that prevents soil erosion by leaving a field in alternating hills and holes to prevent rains from washing it away has been developed by government scientists. Alternating shovels work up and down with the forward motion of the plow, scooping out the dirt and piling it at regular intervals. The machine leaves 10,000 such holes per acre, each having a capacity of about three gallons of water. The outfit can be used for cultivating crops in rows or on fields that are lying fallow.

MYSTERIES OF BALL LIGHTNING STUDIED BY WEATHER MAN

Secrets of ball lightning, one of the least understood of electrical phenomena, are being sought by Dr. W. J. Humphreys, of the United States weather bureau. Observers of ball lightning are asked to answer questions prepared by Doctor Humphreys in the effort to throw new light on the phenomenon. Ball lightning is a slow, long-continuing electrical discharge that floats through the air or runs along the ground in the shape of a ball. The color varies from red through blue to dazzling white. These glowing balls often enter houses, floating around with a crackling noise, but seldom do any harm.

*Q 152
of ball lightning
studied by weather man
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POPULAR MECHANICS

357

MIKE CALLS NURSE
TO PATIENT'S
BEDSIDE *a 1496*

Cannal locate
Patients in one London hospital only have to groan to bring a nurse to the bedside, for a microphone loud-speaker device carries that groan to the nurses' central sitting room, where one always is on duty. The instrument, which stands in a cabinet beside the bed, is so sensitive that it will record words spoken at the other side of the room. Ordinary tones from the patient are reproduced clearly in the nurses' room, while the nurse is able to carry on a conversation with the patient, finding out what is required without going to the bedside. The device also warns the nurse of the sudden collapse of a patient.

RIM PULLED FROM TRUCK TIRE
BY WATER PRESSURE *71460*



Water pressure is used for pulling the rim from truck tires in an extractor invented to save time and labor in removal of large tires. The tool provides its own pressure by means of a small pump, incorporated in it.

Its inventor claims a saving on wedge rings, which are removed without breaking when the machine is used. Ordinarily the wedge rings are rusted to the rim, and it is hard to jar it loose even with a sledge hammer. Removal of a truck tire with the extractor requires about half the time necessary for the workman not so equipped.

A motorcycle air-spray paint gun is being used for road marking.

*Mr. Charles O'Leary,
Adelli Tire Service
Minneapolis, Minn.*



Riding the Surf on a Catamaran, a Raft Set on Twin Pontoon with Waist-High Oarlocks for Rowing in Standing Position *71461*

FLOAT SET ON TWIN PONTOONS
OPERATED WITH OARS *71462*

Shooting the surf with floats set on twin pontoons is the latest aquatic sport at California beaches. These catamarans consist of two boat-shaped pontoons which support a platform with oarlocks on waist-high rails, so the riders row standing.

AIRTIGHT LACQUER POT COVERS
424 SPEED UP COLOR WORK *71463*

For use in home decoration, or other types of work, a lacquer pot has been developed which permits leaving the work or using the lacquer occasionally without finding the brush hardened and unusable. The pot is one-quart size, is fitted with a handle and has a cone-shaped cover, so that, after use, the cover may be put on tight enough to prevent evaporation, and still leave the brush in the lacquer. For home lacquering, six or seven pots, as many as there are colors being used, each with its own brush, speed up the work materially, inasmuch as it is unnecessary to clean the brushes.



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Chicago*

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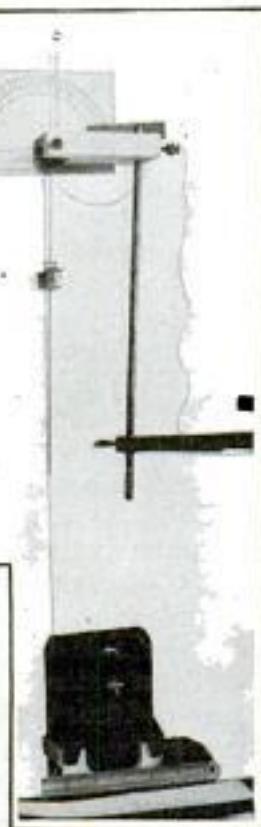
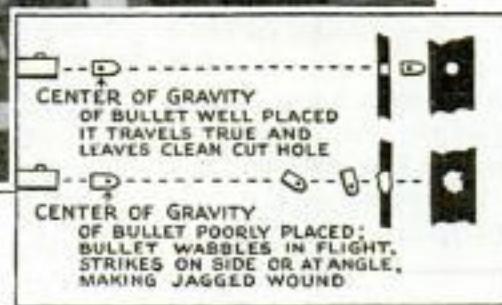
Fingerprinting Pistols in the War on Crime

Lighting the inside of gun barrels to help catch criminals is possible with a

and several guns may be



Expert Examines Pistol Barrel through Microscope on Machine in Large Picture; Gravity of Bullets Is Found with Apparatus at Right



device designed by the coroner's chief physician in Philadelphia. Full power of the microscope may be brought to bear under the full illumination of the barrel. With the same apparatus, the full length of the barrel can be studied with the microscope, which is mounted to move back and forth. Pistols to be studied are clamped in frames mounted on a rack,

studied at the same time. The apparatus is used in classifying markings on the bullet, and in detecting the condition of the barrel, the length of time since the gun was fired and the type of bullet used. Another device determines the center of gravity of bullets, showing how the bullet acts in flight and what effect it has upon striking the object.

VERTICAL AIR TUNNEL OFFERS POSSIBLE POWER SUPPLY

Possibility of harnessing the air to generate power or to create rain in mountainous tropical regions has been advanced recently. It is claimed that if a vertical tunnel were anchored to the side of a mountain, the differences in temperature, pressure and density at the various altitudes would cause to pass through the tube a current of air of sufficient force to drive turbines. If near the sea, such a tunnel would draw up great quantities of moist air that would form clouds throughout a wide radius at the top of the tube,

it is believed. Calculations have indicated that a tunnel with an aperture of forty-two and one-half feet at the top would eject a cloud mass over 75,000 acres.

ELECTRIC BULBS GAUGE WATER IN DISTANT BOILERS

Electric lamps mounted behind colored glass, green and red, are used in a new water-level indicator for boilers and tanks. The instrument may be located some distance from the boiler, since a multi-wire cable is the only connection between the two. No liquid is used in

Mr. Wallace Woodsword

Compressed Air
June 1931

B.J.
Hubas

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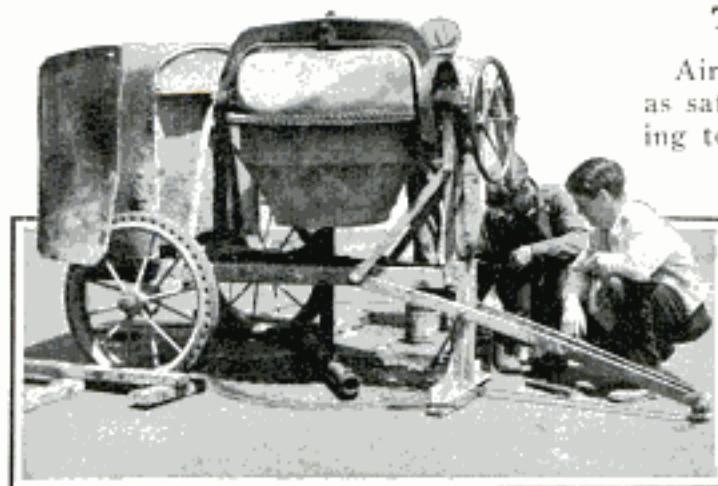
the indicator. The lights are operated through relays from a set of electrodes mounted in a water chamber attached to a steam boiler, or any other liquid vessel from which readings by level are required.

BIGGEST LINER BUILT TO CROSS OCEAN IN FOUR DAYS a 149

Huge turbines, generating 200,000 horsepower, will drive the Cunard line's new passenger ship across the Atlantic in only four days. The vessel, now under construction, will be able to attain speeds of thirty-two to thirty-five knots. Her builders say she will be the biggest and fastest passenger ship afloat. Important to the comfort of passengers is the \$1,000,000 gyroscopic device designed to keep the vessel from rolling and diving in rough weather, and to prevent seasickness. The top bridge will be 100 feet above the water line, with nine short decks rising like steps from a huge platformlike forecastle deck. The length of the liner is 1,018 feet, with a beam of 115 feet. Launching will take place in 1932.

NOISY MANHOLE COVERS CURED BY GRINDING a 1436

Grinding of covers to fit manholes is now possible through the use of a machine devised as a means of reducing city noises. The machine operates on the same principle as the garage mechanic's valve grinder, using an abrasive compound to make a perfect fit between the cover and seat.



Grinder for Manhole Covers Fits the Lid to Its Seat; Noise from Auto and Truck Wheels Is Reduced

Drawn by Harold J. Teiner
1/2 Union Gas & Electric Co.
4th & Main, Cincinnati, Ohio



Clock Tester Is Shown Using a Stethoscope in Listening for Defects in Electric Timepieces

HEARTBEATS OF CLOCK HEARD WITH STETHOSCOPE

Electric clocks are being tested with the aid of a stethoscope like that used by the medical profession for listening to heartbeats. Thousands of clocks on the shelves of one factory are tested in this manner to save time and eliminate the soundproof rooms usually employed in listening for defects in electrically operated timepieces. Accurate workmanship requiring adjustments to two-thousandths of an inch is needed in making these timepieces.

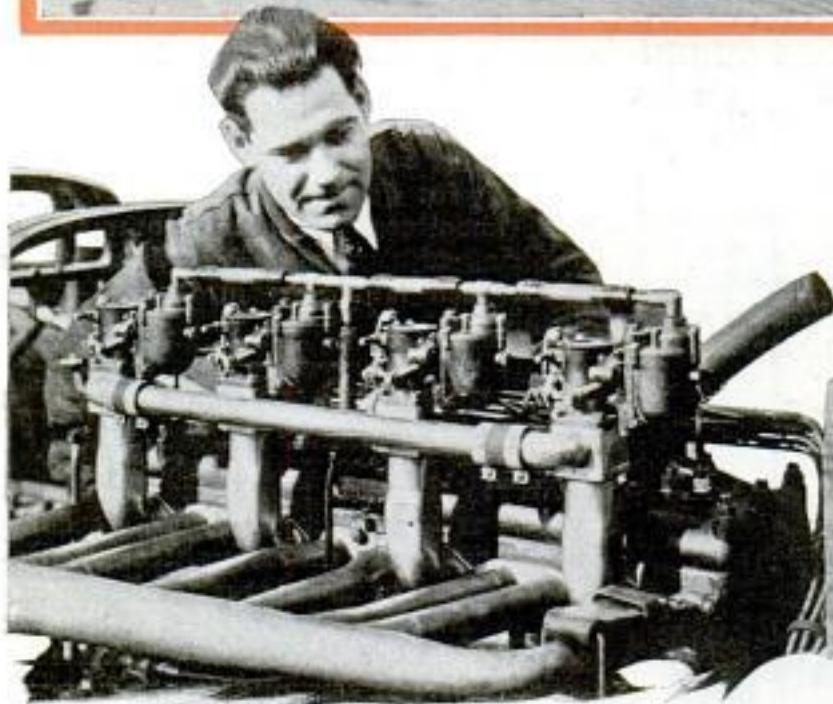
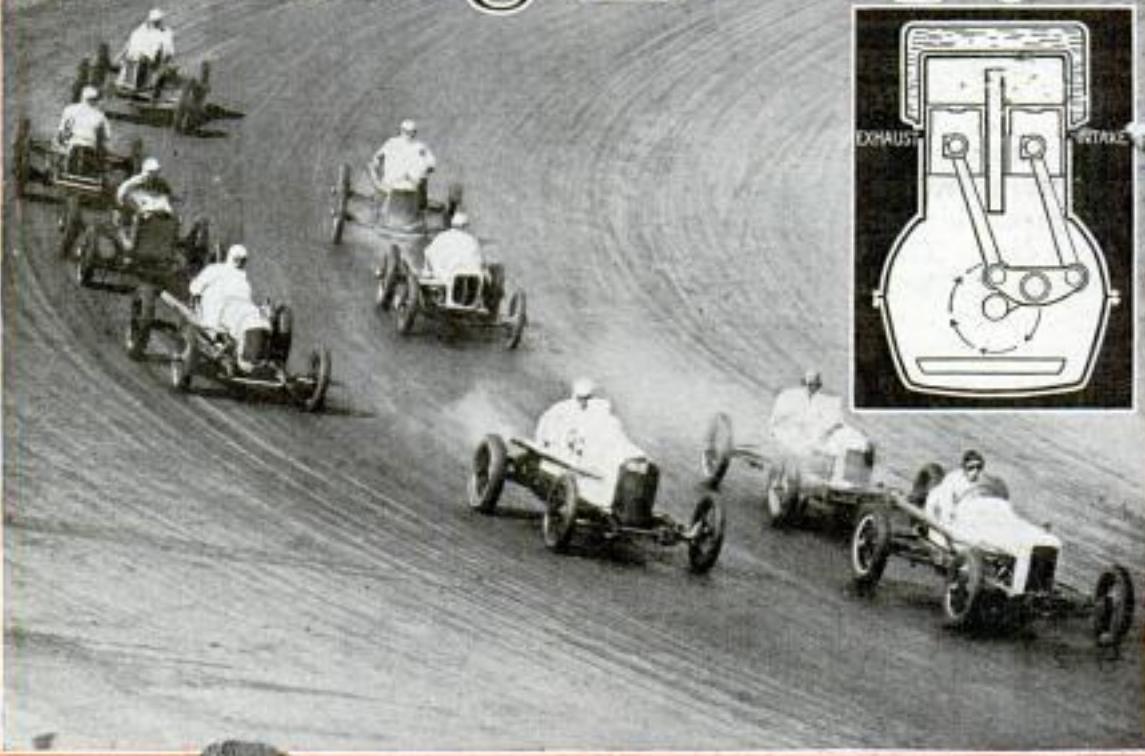
AIR TRAVEL FOUR TIMES SAFER THAN THREE YEARS AGO a 1500

Airway travel is more than four times as safe as it was three years ago, according to figures of the committee on aviation of the Actuarial Society of America. In 1930, the committee said, the chance of death among passengers in planes on scheduled flights was one in 17,000, while in 1929 it was one in 10,000 and in 1928, one in 4,000. The improvement is attributed to closer supervision, extension of radio-beacon service and weather information, and excellence of American planes and engines.

Kans. City Star.
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959-8th Ave New York

Pepping "Em up" for



Cars Bunched on the Turn, Above, and Below, Snowberger with His Studebaker Eight; Inset, Leon Duray's Engine in Cross Section

FROM motor speedways have come the improvements in motor-car design, worked out under the flaming lash of speed, which, ultimately, found their way into the present perfection of the auto-

mobile you drive. In the last few years, the racing car of one day became the passenger car of the next.

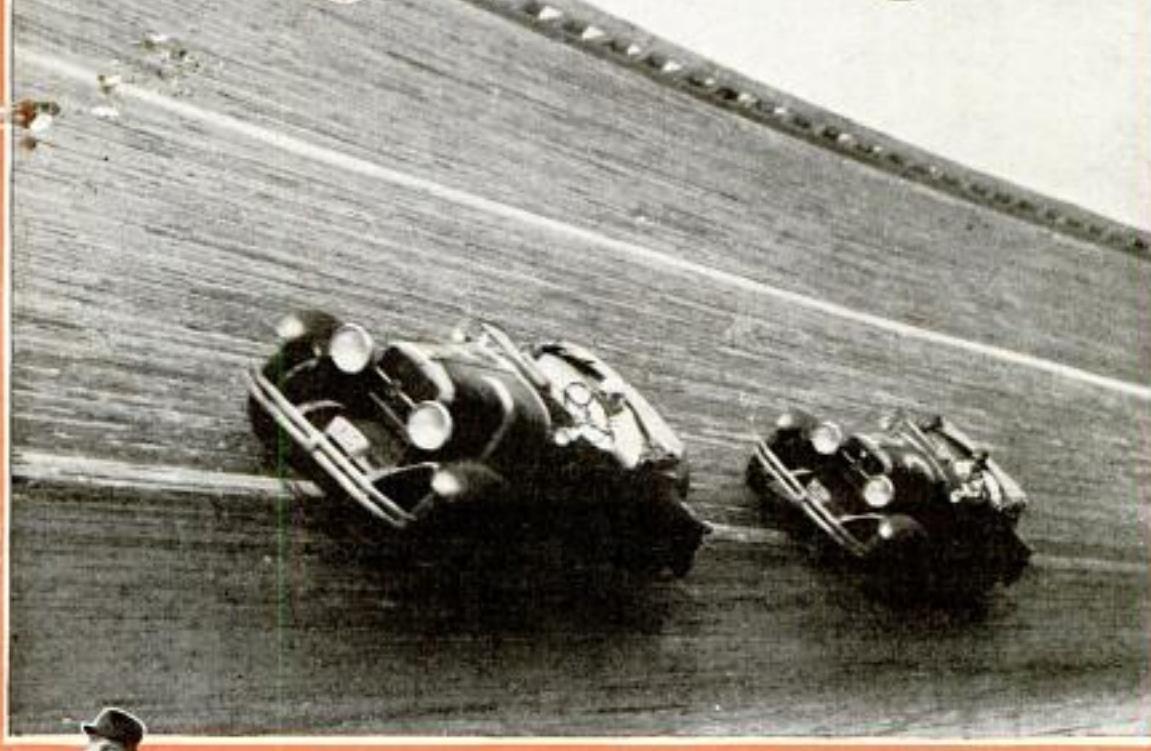
But now the tables are turned—or at least turning. The "pepped-up" passenger car now is threatening to crowd the costly racing creations off the nation's speedways. Stock cars, "stripped to fighting trim," are stealing the limelight from the custom-built "dynamite bugs."

It may seem surprising that racing cars made of the same parts used in passenger cars are able to compete successfully

with the highly specialized race cars costing \$10,000 to \$15,000, but the explanation is simple. Generally speaking, only three major changes were made in their engines. First, the compression ratio is

9/12 '79

the Roaring Road



Thirty-Thousand-Mile Test Run of Studebaker Cars. Above; Below, Cranking the Cummins Diesel Car with Batteries on Service Wagon

raised from, say, five to one to perhaps seven or eight to one. Second, a carburetor for every two cylinders is usually fitted, since the greater the number of carburetors the more mixture the engine is able to draw in. Third, the muffler is removed and a long exhaust pipe fitted, thus increasing power by reducing back pressure.

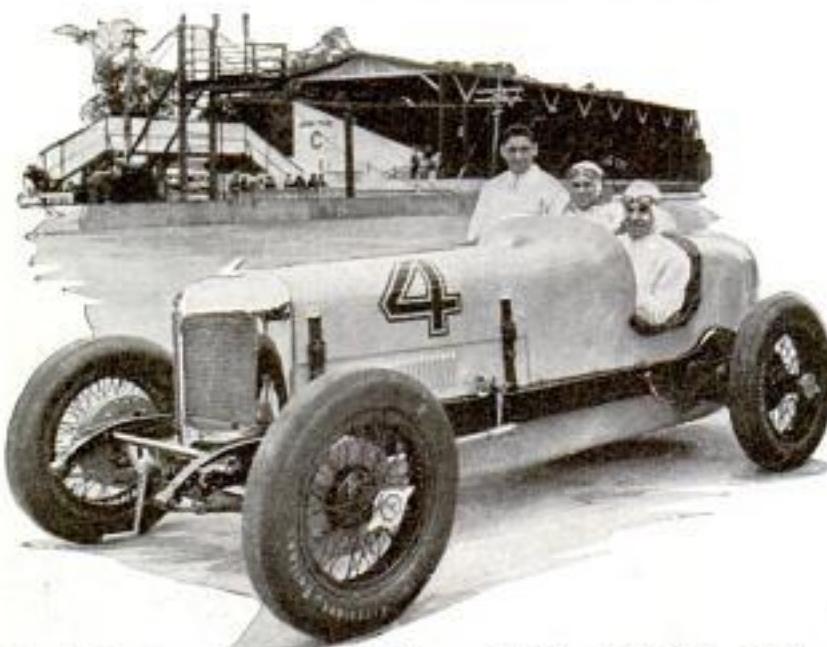
Some builders put in racing camshafts while others do not. Aluminum pistons are fitted in every case. Heavier valve springs are installed and, in some cases,

exhaust valves of better material are used. Oil coolers also are fitted.

Wheelbases usually are shortened to 100 inches or a little more, since a short-wheelbase car takes the turns better. Some of these cars, such as Red Shafer's Buick and Chet Miller's Hudson, both eights, use two chassis to make one car. That is, Chet Miller's

Hudson has a standard Hudson Eight engine placed in an Essex chassis with frame shortened to give a wheelbase of 107 inches. Red Shafer, likewise, used the Buick model-sixty engine, the rest of the car being a model-fifty except the frame which was specially made. All the stock cars at the last Indianapolis race had specially built bodies, and their low wind resistance, as compared with the usual passenger-car body, alone added about twenty miles to the maximum speed.

When the "Who's Who" of speed mer-



a 12 19
Russell Snowberger in Racer He Built around Salvaged Studebaker Engine; the Entire Car Cost Only \$1,500 to Prepare for the Track

chants and fast cars lined up for the start of the Indianapolis classic this year, nine of the starters were of stock-car origin. Further, and more significant, the car which held the coveted "pole position," emblematic of the fastest qualifying speed, was a homemade racer built and driven by Russell Snowberger—powered by a Studebaker President Eight motor picked up off a salvage pile.

Back in the track garage were half a dozen hand-built specialty jobs costing "important money," which had been crowded out of the starting list by the revamped stock cars. In one "stable,"

there were two shining speedsters which had cost their owner nearly \$70,000, but which could not match the qualifying pace set by the former passenger automobiles.

At the 300-mile mark of the Indianapolis race, three of the first five leaders were semistock cars. There were Tony Gulotta, Russell Snowberger and Lu Johnson, holding second, third and fifth place, respectively. Each was driving a car powered by a Studebaker President Eight motor—alike in all essential details of design

and construction to thousands of Studebaker passenger cars all over the country. Behind them were a score of hand-built cars, any one of which cost more than all three of those revamped passenger cars together.

To make the story complete, one of those revamped family cars really should have won the race. Indeed, it was no fault of their performance or stamina that such was not the case. It was the fickle fate that seems to rule the Indianapolis track that finally came to the rescue of the "specialty jobs." When Billy Arnold's car broke an axle, fate decreed



Going over the Wall at the Indianapolis 500-Mile Race; Fred Winnai Is the Driver of the Car in the Air; the Third Car from the Right Also Crashed, Injuring Both Occupants

it should go into a spin directly in front of Johnson's Studebaker, and both crashed through the wall. A few laps later, just as Gulotta was about to push his Studebaker-powered mount into the lead, grease left on the track by Arnold's wreck, caused Gulotta's car to skid. With victory virtually in sight, he struck the wall. Snowberger continued on to finish in fifth place.

All of which brings up the question: How near stock is a "near-stock racer"? Consider the Hunt-Jenkins Special in which Tony Gulotta came so close to winning the nation's premier speed event.



Stock Studebaker Driven by Azzari, Taking the Turn on the Santiago Circuit He Won in 1930; Top, Red Shafer and His Buick Racer

George Hunt, designer of the car, bought the motor just as you or I would buy one. He increased the compression ratio; installed four carburetors instead of the standard dual carburetor; magneto ignition, to obviate the need for carrying a storage battery, and removed the fan. Pistons, connecting rods, crankshaft, bearings, valves, lubrication system and water-circulation system remained untouched. In the chassis, front and rear axles, axle gears, free-wheeling transmission and steering system were utilized just as they came from the factory. The radiator was of standard production, cut down to decrease the frontal area. Wheels and tires were of special racing design, and the racing body naturally also was specially built.

Snowberger built up his car in 1930. When the job was ready to run, it represented a total expenditure of approximate-

ly \$1,500. Snowberger raced the car throughout the 1930 season, finishing fourth in the national championship standing, and won a total of about \$10,000 in prize money. He is authority for the statement that maintenance on this car during the entire season cost him less than the price of a new hat. During the winter the car stood in a barn. In

the spring, he replaced a few minor parts and was ready to go back to the road.

Among the specially built racing cars seen this year, Leon Duray's sixteen-cylinder two-cycle car attracted much attention. Everybody admitted it was by far the fastest car at Indianapolis, but the water jackets were so thin it couldn't be run more than a few miles before the water would boil. There were four cylinder blocks, and the crankshaft had eight crankpins. Thus each pair of bores had its two connecting rods linked to one crankpin, the pair of pistons moving up and down together. Above them was a single combustion chamber. Near the bottom of the stroke, one piston uncovers the intake port and the other piston the exhaust port, at which time the supercharger forces mixture in, driving the exhaust gas out. The supercharger was built on the gear-pump principle.

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a 1453

Handley
Page

The British Pterodactyl Plane, So Named Because of Its Resemblance to a Prehistoric Monster, the Wings of Which Form Rudder and Elevator Surfaces

dub.

THREE TIMES BULLET'S SPEED REACHED BY CENTRIFUGE

Whirling so fast that its rim travels three times as rapidly as a rifle bullet, a new type of centrifuge has been devised by Dr. J. W. Beams and A. J. Weed, of the University of Virginia. The centrifuge is the device used in the cream separator to separate cream from milk. A speed of 10,000 feet a second was reached by one model of the new type, with a force equal to a million times that of gravity. The device is expected to be used in scientific laboratories where much higher centrifuge speeds are necessary for clearing fine silt out of turbid water, separating cells into their constituent parts, and for getting tiny water droplets out of oil. An

arrangement of outlet tubes provides for continuous feeding of material and for its separation without stopping the device. In this respect it resembles certain types of cream separators into which whole milk is poured, while jets discharge milk and cream.

WRENCH WITH GRIPLIKE VISE IS QUICKLY ADJUSTABLE

Two arms, which close like plier handles, are used in forcing together the jaws of a new monkey wrench so that a vise-like grip is possible. The wrench is easily adjustable, slipping loosely on or off the nut, but holds firmly when the vise attachment is applied. The head of the wrench is electrically welded to the shank.

Duane Service 537.40

7/9/31

Woodworth Specialties Co.
Binghamton, N.Y.

Copyrighted material

ny. Times 7/5/31 a 1428

SPEECH SCRAMBLER FOR RADIO
KEEPES TALKS PRIVATE

a 1482

Speech scramblers have been adopted by the operators of transatlantic radiophone service to prevent "listening-in" by experimenters whose sets are capable of reaching the correct wavelength. The high frequencies of the human voice are converted into corresponding low frequencies while the low frequencies are changed into high. The result is complete unintelligibility to the listener. The words "telephone company," for instance, come through "play-o-fine crink-o-nope" when spoken into the speech inverter. An electric translating brain changes all recognized words and sounds so completely that all the eavesdropper can hear is gibberish. At the other end of the secrecy system, a translating brain rearranges them back again in their proper order.

MAGIC EYE REGULATES LIGHTS
FOR OFFICE WORKERS

a 1461

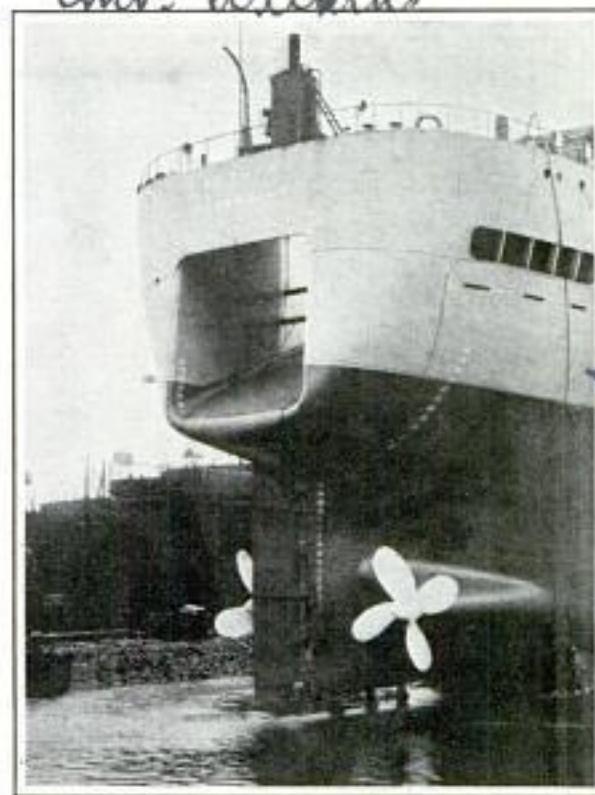
Artificial lighting of offices is limited to the actual time it is required by a photoelectric relay which turns the lights on and off as it grows darker or lighter. In order to enable the device to function in varying degrees of light, the control mechanism may be set to turn on or off at any desired degree of visibility.



Photo-Electric Relay, Which Turns on Office Lights as Darkness Approaches, Saving the Eyes of Workers

J. V. Dresky, engineer,
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

Com. Wilkins



Courtesy Northern Whig and Belfast Post
Latest Type of Whaling Vessel with Door in the Stern
for Hauling Aboard Harpooned Whales

WHALING STEAMER HAS DOOR
IN STERN TO AID WORK

Harpooned whales are hauled aboard a new whaling steamer through a door in the stern. The ship with this novel feature was built in Ireland for use in the Antarctic, to which the whale has been driven by years of hunting.

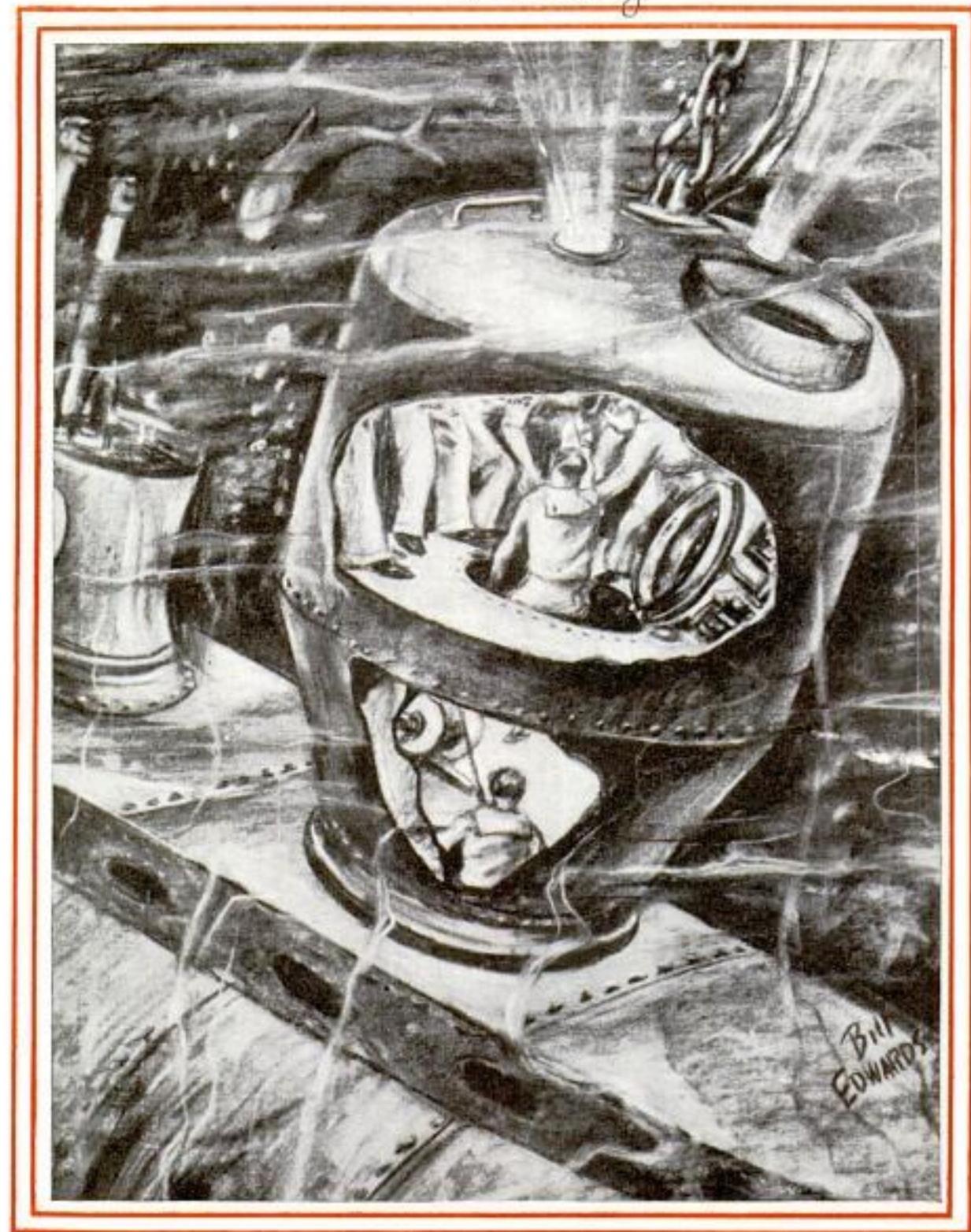
a 1489
BRAZING SPEEDED UP BY ALLOY
WITH LOW MELTING POINT

Speed and economy on brazing jobs will be made possible by use of a new alloy, for which a patent has been requested. The alloy contains a small percentage of silver and has the unusually low melting point of 1,300 degrees Fahrenheit. Other commercial solders containing fifty per cent silver, or less, will not flow freely at less than 1,400 to 1,600 degrees. The new alloy, used in connecting copper joints, stood up under a tensile test of 30,000 pounds per square inch. It can be used also for joining brass, bronze, nickel, nickel-silver, extruded brass and bronze, monel metal and other metals and alloys fusing above 1,300 degrees.

Built by Workmen, Clark & O'Farrell, Belfast, Ireland.

#10 Avondale Foundry.
This ship small quantities.
#125, not large quantities.

a. 1464 Capt. John L Comty.
914 Jefferson S.W.
Washington, D.C.



THE new submarine rescue chamber developed by the United States navy for deep-sea rescue work, depicted by the artist as it appears fastened to a stricken hull. Eighteen men can be brought up at one time and the apparatus is capable of operating at a depth of 600 feet.



Courtesy Washington Evening Star

New Rescue Chamber Laughs at SEA

FOUR hundred feet below the surface of the sea forty men in a submarine sit in deathlike silence. About them are only cold steel walls. Lights flicker intermittently. One, two, five twenty minutes pass. Watches roar on. Will they ever come? An hour drags by. one, two, three...

Suddenly a slight quiver runs through the submarine. The motion dies away, then comes again; steady this time, as if something were straining



The Rescue Chamber, Above; Below, Magnetic Speaker Which Can Be Attached to the Hull of the Stricken Boat for Communication

at the sunken craft—a rasping, bumping sound. Every man is now alert.

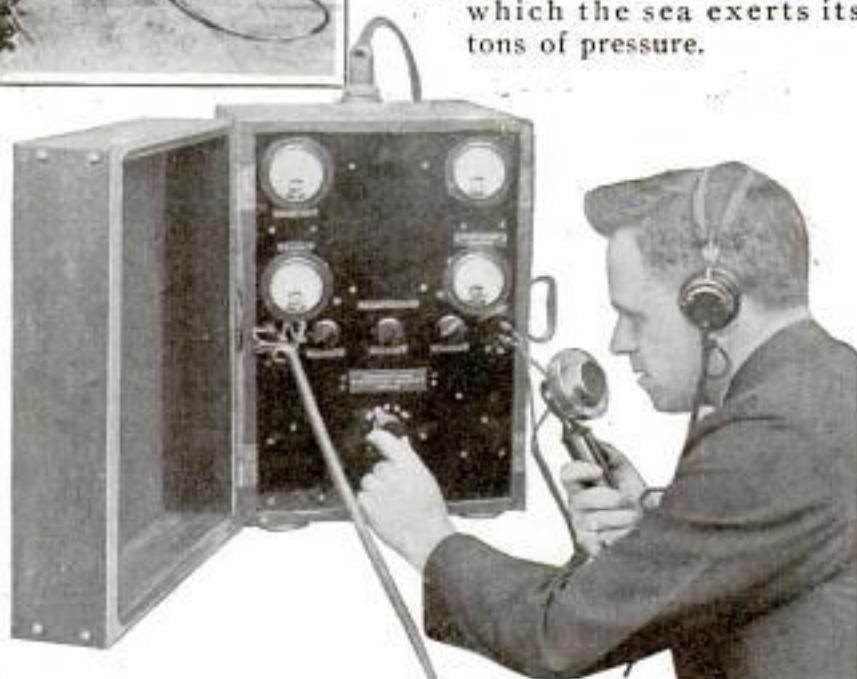
In this manner the navy department recently introduced to its submarine personnel its new rescue chamber capable of taking a crew from a stricken submarine in 600 feet of water at the rate of eighteen to twenty men to the lift. The new chamber, developed by Lieut. Com. Allen R. McCann, represents out-



R. 1464.

standing improvements in a type of diving bell experimented with by the navy during the winter of 1929-30 off Florida. Let Commander McCann explain the new bell and the principle upon which it works.

"The distinguishing feature of the new submarine rescue chamber is its self-operation. With the new rescue chamber on board, a vessel hovers over the spot where the submarine is down. A diver descends to the submarine where he hooks a heavy steel cable from the chamber to an 'eye' on the hatch of the sunken vessel. A motor and winch, operated by a crew of two men in the upper of the two compartments of the rescue chamber draw the chamber down to the hatch where it is made fast. The chamber is kept from wobbling by the guide cable fastened to the submarine hatch eye, a cable from the surface vessel to the top



Diver Ready to Descend to Connect the Rescue Chamber with the Submarine; Below, Operator Demonstrating the Subsea Two-Way Phone

"When the imprisoned men have been released, the submarine hatch is closed and then the rescue-chamber hatch. Water ballast is released into the lower compartment equal to the weight of human freight taken on, and the compartment is flooded from the sea. This causes the chamber to break its seal and rise by its own buoyancy to the surface, its speed held in check by a braking clutch."

of the chamber, and a system of counterbalancing lead weights between the outer and inner wall of the lower compartment.

"The upper compartment of the chamber is airtight and houses the chamber crew. Light, air and telephonic communication are sent them from the surface vessel through cables. A hatch leads from the upper compartment to the lower, which is open to the sea. A rubber gasket faces the mouth of the lower compartment. Water ballast tanks are housed between the walls of the chamber. The rubber mouth of the lower compartment presses tightly against a circular steel plate around the submarine hatch, making a seal. The water in the lower compartment is blown out, leaving it a vacuum cup against which the sea exerts its tons of pressure.

Engineers Washington
Lamp Co 1256

Bloomfield N.Y.

POPULAR MECHANICS

369

WIRE FINER THAN HAIR
USED IN ELECTRIC
LIGHTS a 1398

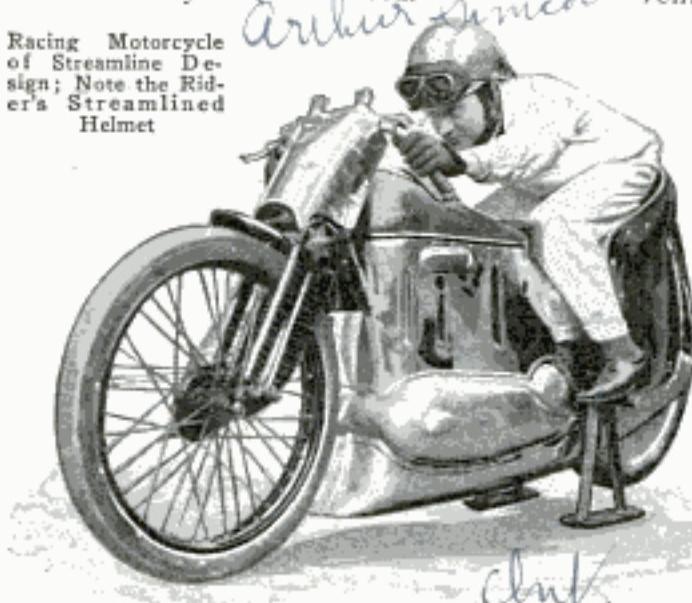
Wire four ten-thousandths of an inch in diameter, one-fifth the thickness of human hair, provides the filament for a type of electric lamp recently developed. A diamond with a tiny hole bored in it, serves as the die through which the wire is drawn. When coiled in a filament, 1,500 turns are required to the inch, and no two turns may touch. Although the wire is made of tungsten, one of the heaviest of metals, a pound of it would stretch 144 miles. Lamps in which the fine wire is used serve to illuminate house numbers, clocks, the inside of refrigerators, cabinets and household lighting ornaments.

TWO-HUNDRED MILE BIKE
IS STREAMLINED a 135

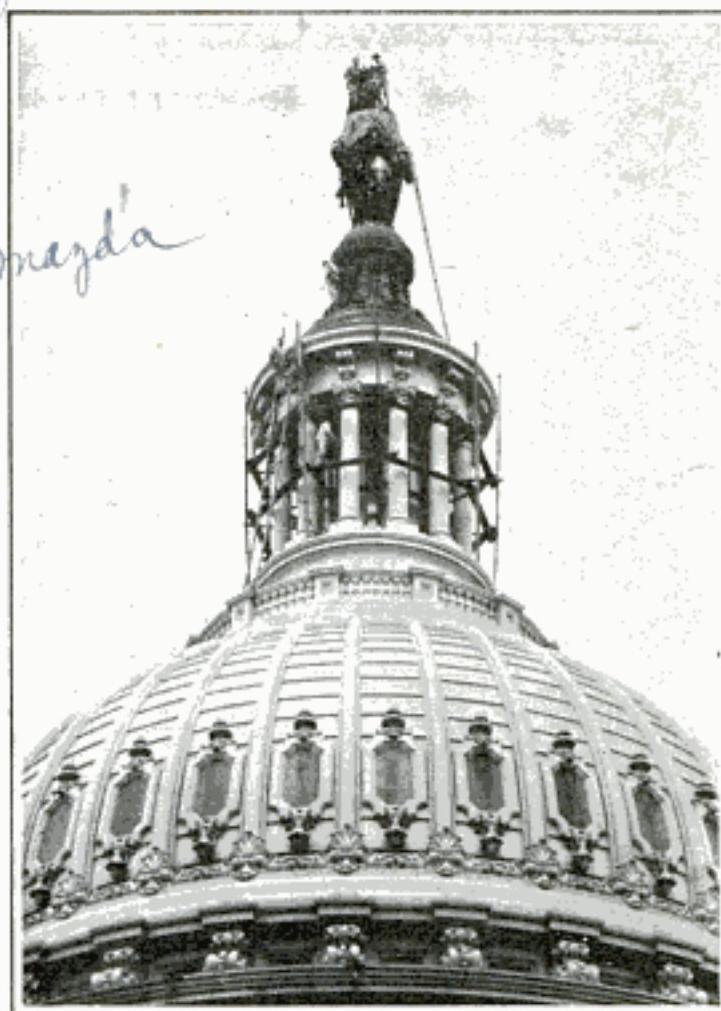
Following the example of racing automobiles and airplanes, an English motorcycle racer has had a motorcycle built and streamlined to attain a speed of 200 miles an hour. With the exception of the front wheel, the cycle is inclosed in metal, shaped to smooth the air flow around the speeder. Even the racer's helmet is streamlined in order that dragging eddies of air back of his head may be eliminated.

Racing Motorcycle
of Streamline Design;
Note the Rider's Streamlined
Helmet

Arthur Simeon



clerk



© Harris & Ewing

Steeplejacks Replacing the Platinum Tips of Lightning Arresters
on Dome of the Capitol in Washington

WORKMEN ON CAPITOL'S DOME
REPAIR LIGHTNING RODS

Steeplejacks recently made their quadrennial trip to the top of the statue of the Goddess of Freedom surmounting the dome of the capitol in Washington, to replace the platinum tips of lightning arresters that have been damaged by intercepting bolts. Every four years workmen climb to the capitol's top to repaint the dome and inspect the lightning tips.

FORECASTLES MOVED AFT a 1353

"Sailing before the mast" will soon be obsolete in the British shipping world. Orders provide that quarters for crews must be aft of the mast, because those in the bows are unsanitary.

Herald Examiner
6/19/31

a 1142. Cml. Chas
370 helps Austin.
11795 Broadway

POPULAR MECHANICS

N.Y. Times
6/19/31



Lighthouse on Empire State Building Is 1,200 Feet above the Street and Can Be Seen for Fifty Miles

LIGHTHOUSE ON A SKYSCRAPER VISIBLE FIFTY MILES

Men who "go down to the sea in ships" near New York are being guided by a distinctive lighthouse, built in the heart of Manhattan's business district, and standing more than 1,200 feet above the celebrated "sidewalks." It is atop the Empire State building. Four beams of white light radiate from a chamber at the top of the 200-foot dirigible mast. They can be seen for more than fifty miles at sea.

and are powerful enough to penetrate an ordinary fog. A second signal shows six beams radiating from a ball of light.

CONTINENT RISING FROM OCEAN MAY DEVELOP LIKE JAPAN

In a few hundred thousand years, a whole new archipelago like Japan may emerge from the south Atlantic ocean. This forecast has been made by the Rev. Frederick W. Sohon, Georgetown University seismologist, after recent reports of the discovery of two new islands in the region, coupled with simultaneous seismograph records showing earth tremors that might have emanated from the same territory. The islands appeared off the coast of Brazil, and at first some scientists suggested that they might mean the reappearance of the so-called "lost continent of Atlantis." Father Sohon said there is a ridge along the ocean bed equidistant between South America and Africa, but if there ever was a continent there, it had been completely destroyed. The modern development, he believes, is the result of thousands of years of erosion, sending rock from the mountains down to the continental shelf of the Americas. This, he said, might pile up so much weight that the pressure would cause a ridge in the ocean bed.

UNIVERSAL ANVIL FOR BENCHES SAVES WEAR ON VISE

Handling hundreds of operations in the shop, garage, plant or home, a flat bench anvil has been devised that saves much time and breakage of vises on work for which they are not intended. It combines the solid base of the anvil with many of the advantages of the vise, and threaded holes are provided to permit anchoring to the bench when desirable. Any operation for which an anvil is designed can be carried out on this tool, and many additional ones are possible.



Cincinnati Tool Co
1900 Waverly Ave
Cincinnati, Ohio

A 1222 Cont. Andrew R. Boone
613 Spreckels Theatre Bldg
San Diego, Calif

NEW TRICKS of the YAWARA

THE officer had been cautioned not to patrol a certain darkened street without his night stick. "Some 'hood' will get you," he was warned. But he walked unconcernedly along his beat until suddenly a pair of arms wrapped themselves in a headlock around his face.

Instead of trying to pull away or resist, the officer in turn surprised his assailant by crowd-



Professor Matsuyama Who Is Teaching California Police Ancient Yawara, Standing before His Family Seal; Left, the Instructor Demonstrating a Simple Trick by Which an Attacker Can Be Overcome in Less Than Three Seconds

ing quickly against him, reaching with one hand to grasp the thug's belt in the small of the back and pulling him straight up on his own hip. As he did this, he tossed the hoodlum easily to the ground, grasping his right arm as he fell. As both men struck the walk, the hoodlum lay on his back with his right arm extending horizontally at a right angle from his body. Quicker than the eye could have followed the action, the officer, also on his back, grasped the thug's arm between his knees, holding the sleeve near the elbow with his right hand and grabbing his wrist with the left. Thus in less than three seconds the would-be assaulter was



lying helpless, one arm in a powerful vise. And the officer still had his feet free to kick the thug in the stomach, ribs or face.

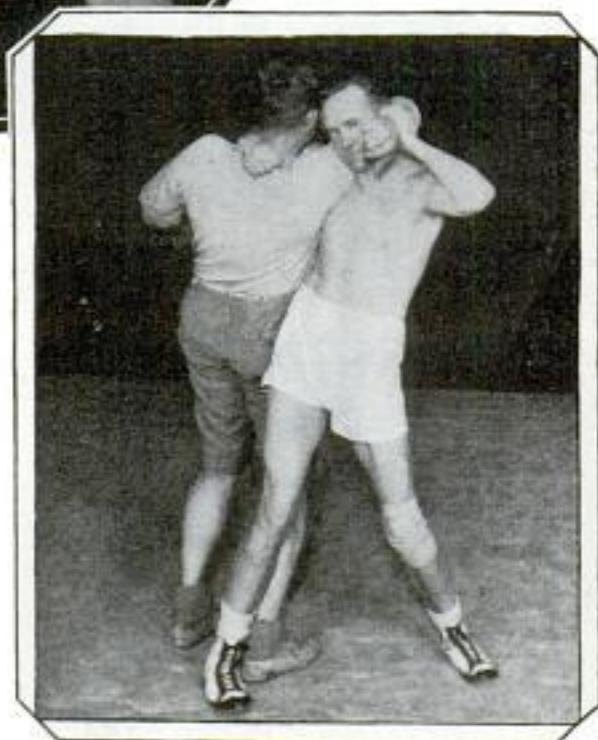
In this painful little trick, the officer had applied the ancient art of "yawara," a Japanese system of defense and offense older than the better known jiu-jitsu. Not less than thirteen vicious yawara blows will bring death to the victim if properly applied. These are so deadly that not even the California police, who recently have been taught some of the secrets of yawara, know many of them.

The philosophy of the Orient is based on the theory of non-resistance. Peoples of the Far East have emphasized the practice of agreeing with their enemies, and in adopting yawara, California police agree with a criminal so quickly that the police apparently place themselves at a disadvantage. A flexible willow bends and yields before the blast of a gale, yet it remains intact. In yielding, a police officer is really tricking his adversary and opening the way to a sudden counter-attack.

In yawara, intelligence and skill are

matched against bulk and brawn. Yawara often is confused with jiu-jitsu and wrestling. In wrestling, one must throw one's opponent. The jiu-jitsu expert frees himself from an opponent. The yawara man places his adversary in a position where, unless he admits his defeat, he may suffer serious injury. In yawara there is a countermove for every twist, wrench, pull, push or bend, but the yawara expert does not oppose. By a gentle twist of the wrist or slightly increased pressure on a nerve, blood vessel or bone, the smallest policeman, or police woman, can subdue the strongest wrestler without so much as perspiring. The tricks include such playful stunts as twisting a man's finger nearly off, wrenching a shoulder blade from its socket or breaking an instep.

Fourteen centuries ago, as Frank Matsuyama, a Japanese yawara man, tells the story, a Japanese dropped a



A Painful Handhold, Top; Officer Floors Instructor, Center, and the "Come-Along," Bottom



Trainer Demonstrates How He Would Disarm a Bandit; at Right, He Is Throwing His Heavy Antagonist with a Hold So Painful He Dare Not Fight Back

cat upside down. As the cat whirled over and landed easily on its feet, the Japanese had an idea. It was then that yawara was born. And so fighting men for centuries have fought like cats, excepting that they do not bite or scratch. The Japanese character for yawara means "gentle."

If some one attempts to choke a California policeman from the rear, the officer wilts as though he were fainting. Then he rolls over on his back and suddenly throws his assailant by simultaneously kicking his right knee with one foot and pulling sharply forward against the right foot with his other. This either throws the attacker or, worse, breaks his knee. As he goes down, the officer grabs an ankle under one armpit, twists the foot so suddenly the assailant turns over on his stomach and thus takes himself out of the fight.

Should a thug try to choke an officer from the front, the officer, instead of pulling away, steps forward toward the assailant, places one arm around his back near the waist, and the other forearm against his Adam's apple. Meantime the officer grasps one of the assailant's knees between his own to prevent kicking. Then he presses in simultaneously against the back and the Adam's apple, and as the attacker falls backward, the officer plants



one or both knees on his stomach. The whole operation may last less than three seconds, but in that brief period the attacker becomes completely powerless.

If the man shows fight after the officer permits him to rise, the officer grasps the assailant's right hand with his own right hand. He then swings himself alongside his prisoner until they face in the same direction, their shoulders touching. The officer links his left arm around the prisoner's right arm at the elbow. Now the officer need only twist the prisoner's arm to the right or press his hand down sharply. The latter causes such a sharp pain at the elbow, that any fight left in the prisoner suddenly departs.

a 1308
374

Capt. Andrew Nylfors,
POPULAR MECHANICS

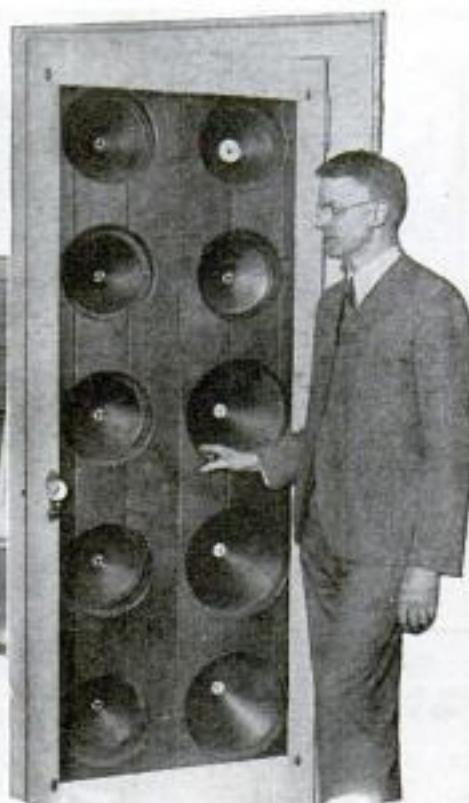
Pipeless Organ Turns Electricity into Music

Richard Ranger Newark NJ
574 Barker Ave.



Top, Captain Ranger at the Keyboard of His Pipeless Organ; at Right, the Bank of Loud Speakers, and, Below, One of the Amplifying Units

Electricity is turned directly into music without the aid of pipes, reeds or blowers, in a new organ invented and demonstrated recently in New York. The instrument has 3,000 combinations of tones, employs 50,000 separate electric circuits and has a frequency range from sixteen cycles, the deep bass, to more than 8,000 cycles, capable of producing tones considerably higher than those of any pipe organ. Employing the principle that an alternating current will cause a humming or singing sound in a loud speaker, the pitch of the tone depending upon the



current frequency, the inventor developed a means of controlling the frequency with a conventional organ keyboard. Overtones and harmonics are controlled with a series of stops, so that almost any musical instrument, from a piano to a flute, can be imitated. There is a producer unit for each of the fundamental tones, and when the organ key is pressed, that tone is picked up and amplified, then reproduced in one of a series of loud speakers. Composite tones, like chords, are "mixed" internally without being heard, until they appear in the loud speaker as a blend of the characteristic sounds.

PHONE FIRE ALARMS RECORDED ON DICTAGRAPH DISK

Records of every telephone fire alarm made in Portland, Ore., are being kept on a dictagraph attached to the switchboard. When an excited householder screams into the telephone, "Our house is afire," and in his haste mumbles the address so unintelligibly the firemen cannot answer the call, the disk may be "played back" slowly so that the words can be distinguished.

Capt A B Nielsen
3208 42nd U
Copyrighted material
newspaper

Test made under
direction of H. C. Stewart
at Pennsylvania State College

POPULAR MECHANICS

375

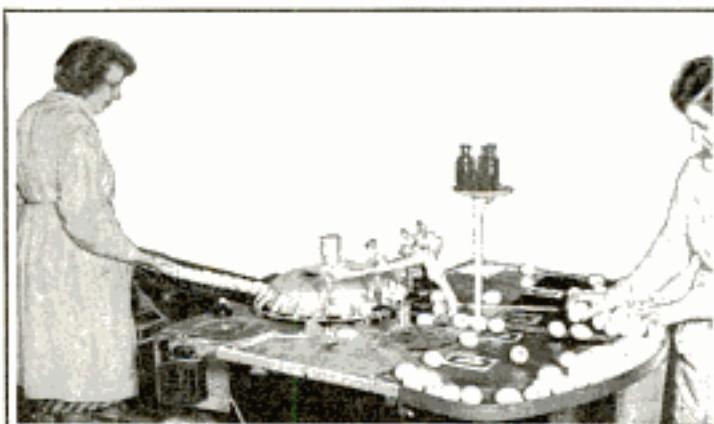
6/24/31

ALUMINUM FOIL IS BETTER HEAT INSULATOR

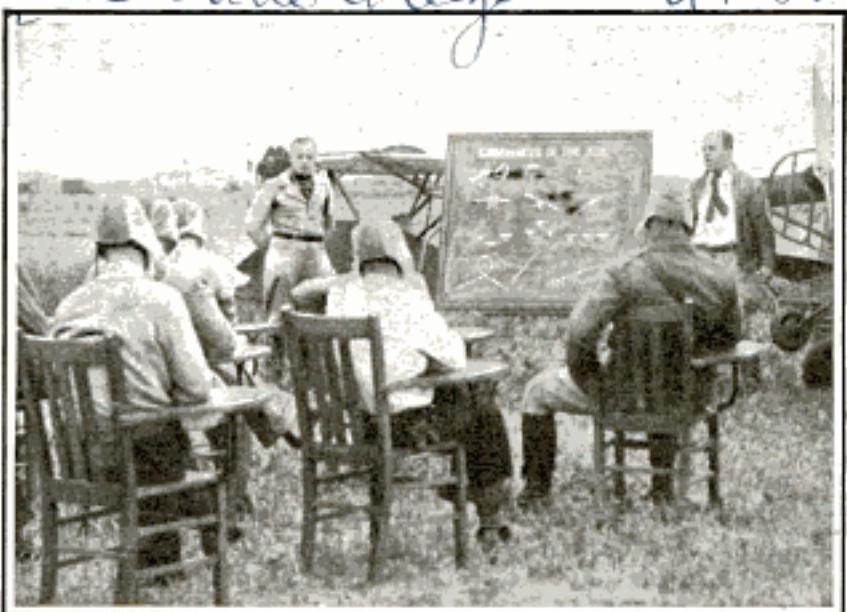
Aluminum foil, no thicker than tissue paper, has been found to insulate steam pipes as thoroughly as an inch of ordinary covering. The aluminum tissue is from three-thousandths to three ten-thousandths of an inch thick and resembles burnished silver, the luster of its surface probably being the secret of its heat-insulating properties. Four experimental pipes were studied in the aluminum tests, one of bare iron, another covered with a single sheet of asbestos paper, a third covered with asbestos an inch thick, and the fourth with aluminum foil. The aluminum foil reduced heat loss twenty-five per cent, while the bare pipe suffered less heat loss than that covered with a single sheet of asbestos.

ROTATING SCALE WEIGHS EGGS AND SORTS THEM

Eggs are weighed and sorted into uniform groups by a rotating scale that is finding use in Germany. The eggs slide down a chute onto the scale which sorts them according to weight and deposits each in a compartment set aside for that weight group. The eggs also are stamped as they pass through the machine.



Rotating Scale Which Sorts Eggs According to Weight; a Marker in the Apparatus Also Stamps Each One



Glider Students Attending an Outdoor Class at the Flying Field Where Principles of Flight Are Learned Before They Go Aloft

GLIDER KINDERGARTEN TRAINS MOTORLESS FLYERS

Members of a primary class of glider students of one California flying school learn the fundamental principles of sustained, but motorless flight in outdoor classes on the flying field where real gliders are used for demonstration purposes. They then go aloft in a balloon to witness the actual operation of the glider before taking it up themselves. From the gondola of the balloon the flying instructor, using a megaphone, directs and corrects each student pilot.

FLAME SIGNAL FOR SUBMARINE TO AVOID COLLISIONS

Japan is experimenting with a flame signal for submarines in the form of an apparatus which fires a projectile from the deck of a submerged craft, the signal bursting into flame on reaching the surface of the water. Such a signal would be used to prevent collisions with surface boats when the submarine is about to emerge, or if it were disabled under water, it could use the flame projectile to indicate its position to rescuing craft. Tests also are being made with smoke boxes placed on deck and fired automatically as the boat submerges to conceal it from the guns of enemy ships.

London Daily Express
6/26/31 printed material

Handwritten notes:
July 8/31
Haley Bigelow holding
J. S. [unclear], Los Angeles, Calif.

a.861 Cont. Lloyd S. Ibrahim
131 Delaware Road
Buffalo, N.Y.

With Uncle Sam's



Officer on Guard at International Border in Southern California with Full Field Equipment

HARD work and danger are the daily fare of the members of Uncle Sam's border patrol—jauntily uniformed, armed to the hilt and ready for any emergency along 6,000 miles of international boundaries.

On the job day and night, these men last year patrolled 7,000,000 miles, seized 20,915 smuggled aliens and 1,427 assorted criminals on charges ranging from murder and thievery to gun running and drug peddling.

All along the Mexican and Canadian lines the border patrol keeps tireless watch to prevent the smuggling of anything, from liquor to cattle, into the United States. In wooded ravines, atop mountain ranges, on the burning deserts of the southwest, they hold still watches, hidden from roving smugglers' eyes, and drive their horses and automobiles into "impossible" places seeking international criminals. Several years ago the mounted patrolmen rode horses. Today most of

them drive automobiles, although along some stretches horses carry the mounties.

The mounted border patrol is at once a new and an old organization. It first came into being several years ago when a group of border riders in Texas swore to uphold the law and keep smugglers south of the line. Since then the service has been reorganized several times and today the mounted border patrol, established in its present form two years ago, is an efficient group of man-hunters who know all tricks of the smuggler.

Not long ago two members were stationed in the brush-covered bottom of a river awaiting a "load" that had been tipped off. Each was armed with a large revolver and a searchlight capable of throwing a narrow beam over 100 yards. They also had an automatic rifle. These weapons and field glasses constituted their day-time equipment. But they also carried another important weapon for use in signaling at night: a Very pistol, for firing white, red and green lights.

At last the faint crackling of brush told the story of someone walking toward them. The mounties waited until the smuggler came within arm's length. One of them stuck a gun in his ribs. It proved to be a boy carrying two sacks of alcohol containers over his shoulders. The boy shouted a warning, and in the silence that followed brush began to crack on both sides of the officers.

"Plop." Up went a white light from the Very pistol. "Help," it called.

The officers listened. The group on the right moved around to meet the second party on the left, apparently to be picked up by a fast car.

Again the Very pistol plopped. This time a green light spread its soft glow over the landscape. It meant the fugitives were moving from the border toward the left.

Meantime other mounties from the near-by station, having seen the white light, hurried to the scene in a fast car.

Modern Mounties

As the "walking smugglers" emerged from the bushes to be picked up in their own car, they walked into the hands of two of Uncle Sam's khaki-clad mounties who knew, by experience, where the contraband runners would hit the highway.

Along the Canadian line, when you drive over the Peace bridge into the United States at Buffalo, you will find a reception committee of at least two men waiting to greet you. Last year these officers passed 2,485,719 vehicles and a total of 7,387,997 persons, which, put another way, means an average of almost fifteen persons every minute.

People make the mistake of thinking the inspectors are working in the dark; that all cars



Above, Modern Mountie Stopping Armed Suspect; Below, Officers at the Boundary, Spying on Suspected Smugglers

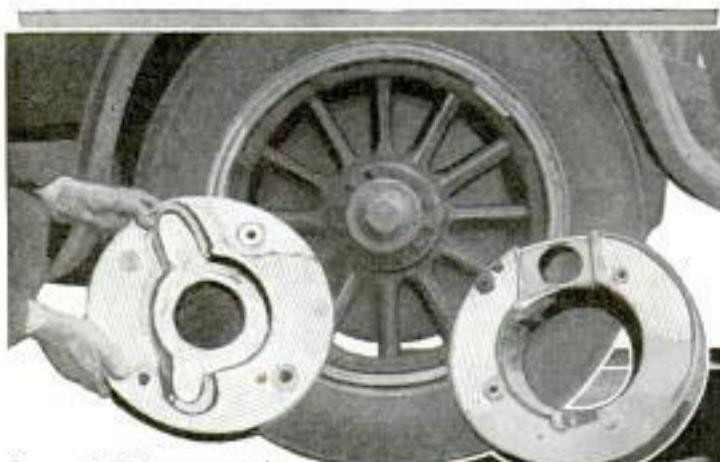
and all persons look alike to them. That is not the case. The inspectors know by long experience the tricks of people bringing in liquor. They look for the unnatural in the attitude of the driver and other occupants of the car. It is next to impossible for people to act normally in a crucial moment of inspection.

One of the most puzzling cases was that of a man who came through daily,

and sometimes several times daily, driving a large car. Both he and the car were examined, but nothing was found. Cushions were examined, gas tank, top, spare tire, but everything was in order. The trips continued. Another more rigid inspection disclosed nothing amiss. But here was a V-type, eight-cylinder motor. One inspector decided to test the spark plugs. Those on one side showed normal life, while the others were dead. The cylinder head on that side was removed and disclosed several

bottles of whisky in that half of the cylinder block, which had been cut away as much as possible. The bottom was lined with copper to keep the bottles in place, and prevent oil from splashing up.

In another car, the battery was faked, the box being filled with contraband. One of the most common smuggling methods a year or so ago was to build metal containers underneath the car. Some of



these held as much as twelve cases of whisky. It was impossible to detect them unless an inspector crawled under the car, which some of them did. But that trick has been ruined by the installation of heavy-powered, protected lights, which shine up under the car, and mirrors at the inspection side set at an angle to tell the inspectors at a glance if there is anything wrong underneath.

The most common stunt today is that of subdividing the compartments of the gas tank so that it only holds enough gasoline to make a run of ten or fifteen miles—into Canada and back—the remainder of the tank holding bottles which are reached through a concealed opening, as under a rumble seat. Sometimes, if the tank is a round one, an end unscrews. All sorts of tank compartments have been found. The smuggler usually thinks that this is a clever idea, but as a matter of fact it is one of the most easily discoverable methods of smuggling liquor. All the inspector has to do is to rap on the tank. He can tell instantly by the sound whether it contains gas only or something in addition. One smuggler thought he was unusually wise in lining his tank and fill-

ing the space between the outer and inner casing with gasoline. But it did not work. The sound was different and he was caught.

Occasionally hiding places in the body are found. A compartment within the entire top of a sedan was cleverly concealed, raised and lowered by secret springs. One of the most curious methods was found in the use of a windshield visor. One thinks of a visor as a thin projection over the windshield. To the casual observer this one was thin. But it was an illusion. It was about three inches thick at the widest part, inside the car, and was found to contain



False Brake Drums, False Cylinders and a Dummy Battery, All Devised to Hold Smuggled Liquor

a number of flat whisky bottles.

Bottles also have been found even in spare tires. Usually a slit is cut in the inner tube.

As many bottles are inserted as possible. A patch is placed over the slit. The tube is put in the casing, blown up and placed on the spare tire carrier. The tire looks and feels like any other spare tire. But there are ways of detecting this trick.



Above, Watching for Smugglers on a Lonely Trail; Left, Using "Very" Pistol for Night Signaling

American shore of the Niagara river is constantly watched. The patrol works in three shifts, and there is an average of one man to each mile and a half of river front on duty every hour of every day.

EACH TOOTH ITS OWN DENTIST IF DIET IS REGULATED Q. 1443

Carefully regulated eating promises mankind future freedom from decaying teeth, and even the healing of cavities in which decay has made considerable progress. This hope is held out as the result of recent nutritional discoveries by Dr. Sherman L. Davis and reports of cases in which teeth cavities filled themselves without mechanical assistance through dietary treatment. In treating diseased teeth by nutrition alone, an X-ray first is made of the mouth. A history of the patient's condition in the past is obtained along with various analyses to determine sugar, phosphorus and albumen requirements and disclose such conditions as anemia, infection and diabetes. With the patient's needs thus determined, a proper diet is prescribed which aids the teeth in recalcifying, or filling up naturally.

One of the most unusual cases of smuggling liquor in clothing was that of a man and his family. He drove up one day with his wife and two children in a flivver, for all the world like a family party out for a day's jaunt. But he gave himself away, and he and the family were ordered to climb out for inspection. In the party was a baby in arms, carefully blanketed as babies often are. Bottles of liquor were found on every person in the party including two pint bottles hidden in the baby's clothing and blankets.

Members of the border patrol co-operate closely with custom inspectors. The

*reported at Capitol Clinic
Club, Washington 20, D.C.
copy righted material*

6/28/43

*ny / federal
drinking*

A1010 Auto-Gyro Vanes Add to Stability of Glider

Hans Richter at Tempelhof
aerodrome



Glider Equipped with Auto-Gyro Vanes; While the Four-Vaned "Windmill" Is Too Small to Increase the Lift Materially, It Is Believed to Add to the Craft's Stability

Following the principle used in the successful auto-gyro airplanes, a German aviator has adapted the horizontal windmill to a glider. While the four-vaned mill is too small to aid materially in increasing the lift of the glider, it is believed to add considerably to its stability in flight and landing. As in the auto-gyro ships, the vanes are kept turning by the force of the wind. In recent tests at Berlin, the pilot maintained communication with the ground by radio.

THREE PILOTS TO EVERY PLANE

There are more than three pilots for every airplane in civil or commercial use in the United States, and the output of aviators has increased fifteen times as fast as the number of planes. While the "crop" of pilots being turned out by aviation schools is not as great as two or three years ago, the number of pilot licenses active is showing a more rapid increase than the number of ships in operation. A year ago there were two pilots for each plane, and today the number is 3.07 to one. The number of licensed airplanes on June 1

W.D. Shantz 6/29/31

was 7,169 with 2,695 unlicensed. At the same time, there were 15,842 licensed pilots and 14,527 student permits active. The total increase in planes in the fiscal year 1930-1931 was three and seven-tenths per cent, while the growth in the number of pilots was fifty-seven per cent.

WOODEN FRAMES ALONG CURB
KEEP AUTOS OFF WALKS



cars rest. These frames are portable and also serve to protect the edges of curbs and sidewalks, preventing them from being cracked or broken by the autos.

broken by the autos.
Three Rivers, P. L.
Copyright material
Canada

a 1170
**U. S. LOSES TENTH OF HAY CROP
BY SPONTANEOUS HEATING**

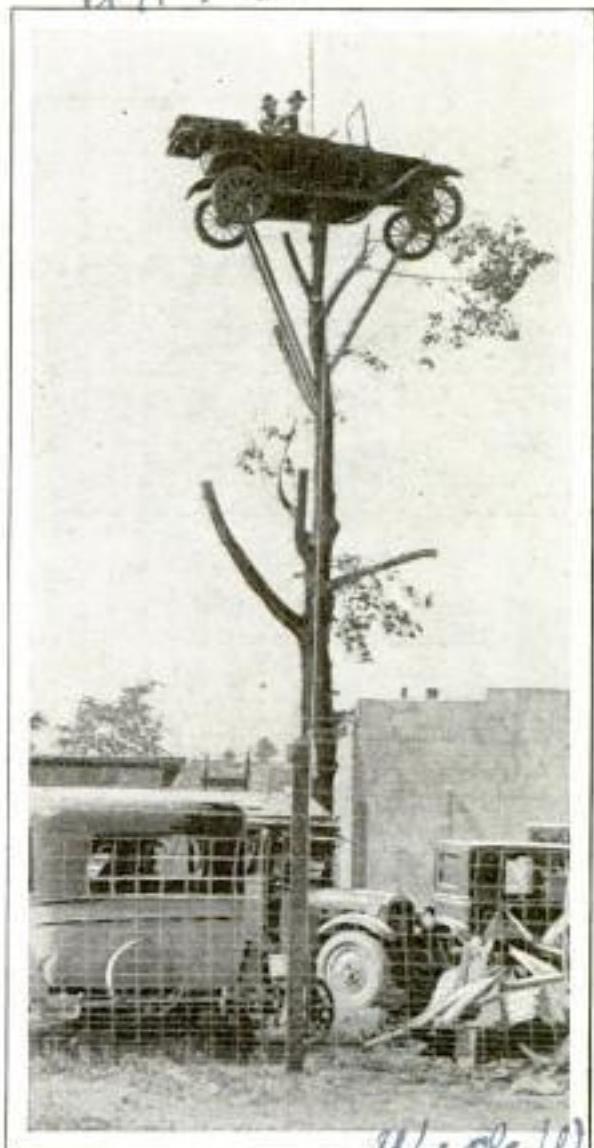
1391
Spontaneous combustion destroys one-tenth of the harvested hay crop of the United States, Dr. C. A. Browne finds in his latest investigations for the department of agriculture. He said that while the annual loss resulting from burning of farm property as a result of spontaneous combustion has been estimated to exceed \$20,000,000 a year, the actual loss in decreased weight and nutritive value of hay during spontaneous heating will amount to many times that sum annually. To prevent fire, Doctor Browne says, a fire pocket may be found by boring into the hay with a hollow steel rod or tube with a sharp cutting edge. The rod will indicate the fire pocket's location from which all the hay must be removed.

a 1220
**SCULPTOR MAKES TIN FIGURES
FROM SCRAPS AND CANS**

Starting with a statuette of a rooster sculptured in tin, an artist, known best for his woodcuts and posters, has opened a field of demand in eastern metropolitan centers that promises to swamp him with work. He sculptured the rooster out of an alcohol can, then used up the rest of the scrap tin around his home making gifts for his friends. When his supply was exhausted, a tin manufacturer sent him a load of scrap.



Lowell Baldwin
Making a Group of Western Figures Out of Tin Cans
and Other Scraps around the Home



Wade W. Ward
Automobile up a Tree Advertises the Owner's Garage
Business; the Figures Are Real Men

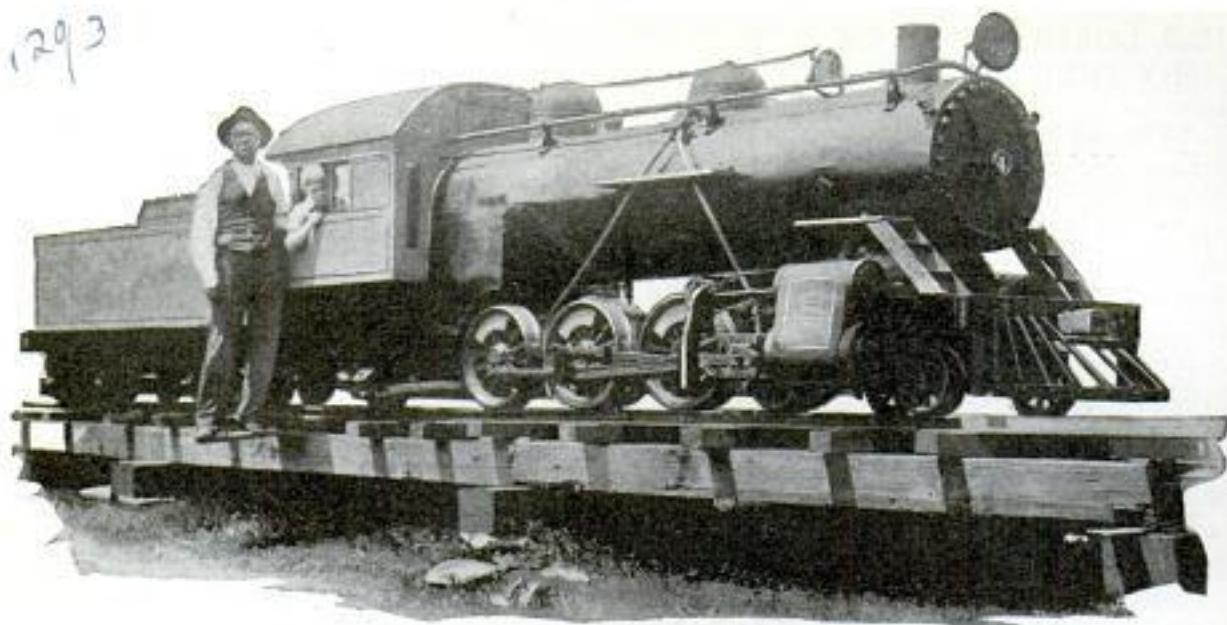
**THIS AUTOMOBILE'S UP A TREE
TO ADVERTISE GARAGE**

In order to attract attention to his garage and wrecking plant, a garage man in an Atlanta suburb has secured an automobile in the top of a tree near his place of business. The owner tells his customers that even should their cars climb trees in such a manner, he would be able to haul them down and fix them as good as new.

The Popular Mechanics' Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished.

*W. H. Roach, of Southern Railway
Maretia, Va.*

a 1293



Model Locomotive and Tender That Was Built in a Blacksmith Shop; It Operates Like a Real Engine and Hauls Twenty Passengers over a Stretch of Track Built for It

MODEL LOCOMOTIVE AND ROAD BUILT BY TELEGRAPHER

After nine months of work in a country blacksmith shop, a railroad telegraph operator constructed a model locomotive and tender some six feet high, patterned after a Southern railway engine. It cost about \$1,000 to build and is operated like a regular engine on a stretch of real track, over which it hauls twenty passengers.

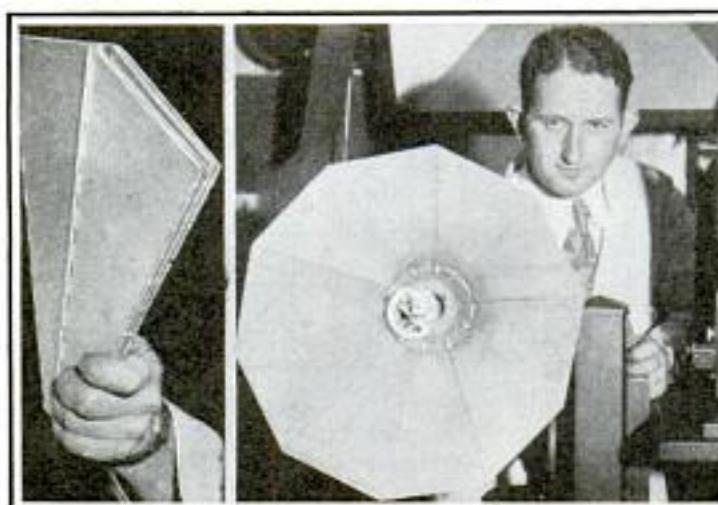
FLASH BULB REFLECTOR FOLDS INTO COMPACT SIZE

a 1307 One of the chief problems encountered by photographers in using the electric flashlight bulbs—that of obtaining the in-

tense illumination provided by flashlight powder—has been solved by the use of a large aluminum reflector which weighs only seven ounces. The reflector is collapsible, folding up into a compact unit so it can be carried in a camera case.

NEW TYPE OF PREHISTORIC INDIANS IN TEXAS

a 139 An exciting adventure in Texas cave exploration has unearthed relics of a type of prehistoric Indian life previously unknown to archaeologists. A representative of the National Museum, following a report of the discovery of an unusual Indian cradle, explored the Big Bend region, and found a cave whose entrance had been almost blocked by huge boulders, with more threatening to fall at any minute. It was necessary to crawl twenty feet through a passage no more than two feet high, inhabited principally by rattlesnakes, scorpions and rats. Dust in the cavern was so thick that masks had to be used and lights would not burn. By the aid of flashlights, the explorer and four Mexican laborers dug out four feet of the cave's bottom. Cradles, baskets, pieces of matting and sandals were recovered, but no pottery was found.



Collapsible Aluminum Reflector Used with an Electric Flashlight Bulb to Increase Intensity of Light

*The Miller Co
Meriden, Conn*

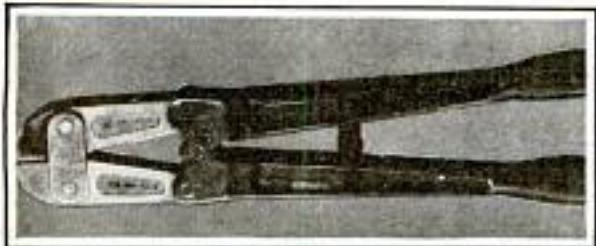
J. M. Satyler
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**MAGNETIC TEST
OF STEEL FOR
HARDNESS**

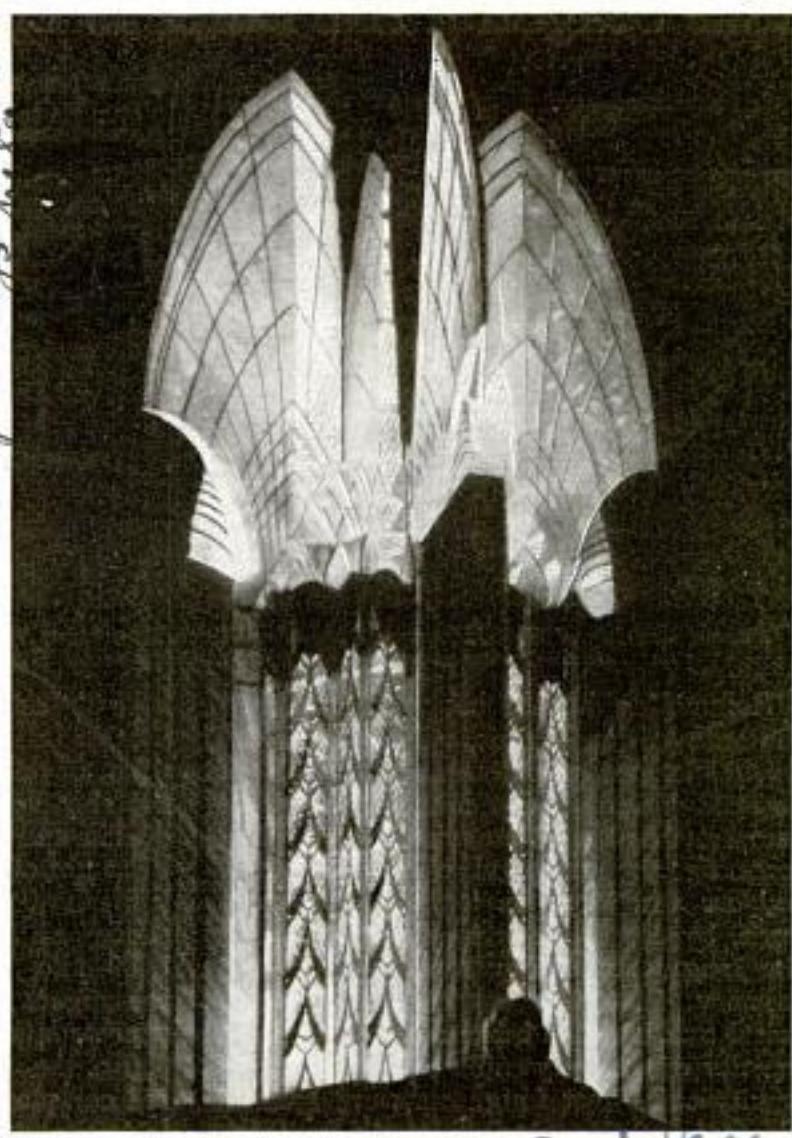
Magnetism will detect differences in hardness of steels which to other tests seem similar, it was revealed recently in a report by Haakon Styri to the American Society for Testing Materials. Mr. Styri's method of testing the steel samples is to place them in magnetic fields as would be done in the case of testing them for fitness as electromagnet cores. The report shows that, whereas other methods of testing steel hardness depend on some mechanical method usually resulting in the destruction of the sample, the Styri method is free from this disadvantage.

**BOLT CUTTER IS
COMPACT AND
LIGHT**

Ordinary bolt cutters are so cumbersome that they are not used except when other means fail. To overcome this objection a lightweight cutter, resembling a pair of pliers, is being produced. It is fourteen inches long and has no complicated adjustments, as there are only three major parts. The cutting knives are of molybdenum-alloy tool steel, and the handles are hammer-forged alloy tool steel. The tool will cut wire or bolts up to five-sixteenths of an inch in diameter.



Lightweight Bolt Cutter Like Pair of Pliers



Water Tower That Blossoms into a Flower at Night; the Transformation Is Accomplished by Illuminating an Aluminum Screen

**WATER TOWER LIKE A FLOWER
WHEN ILLUMINATED**

Floodlighting and decoration have converted a necessary, if unsightly, building adjunct, the water tower, into a thing of beauty at Rochester, N. Y. Illumination experts mounted a flared aluminum screen around the tower and lighted it from the inside, so that it appears in the dark like a rare tropical flower. The lower part of the tower was formed into the shape of a carillon belfry, and the four corners were topped by gleaming fins.

An average of 594 gallons of gasoline was used by each motorist in the United States in 1930.

*Westinghouse Electric & Mfg. Co.
and Pittsburgh, Pa.*

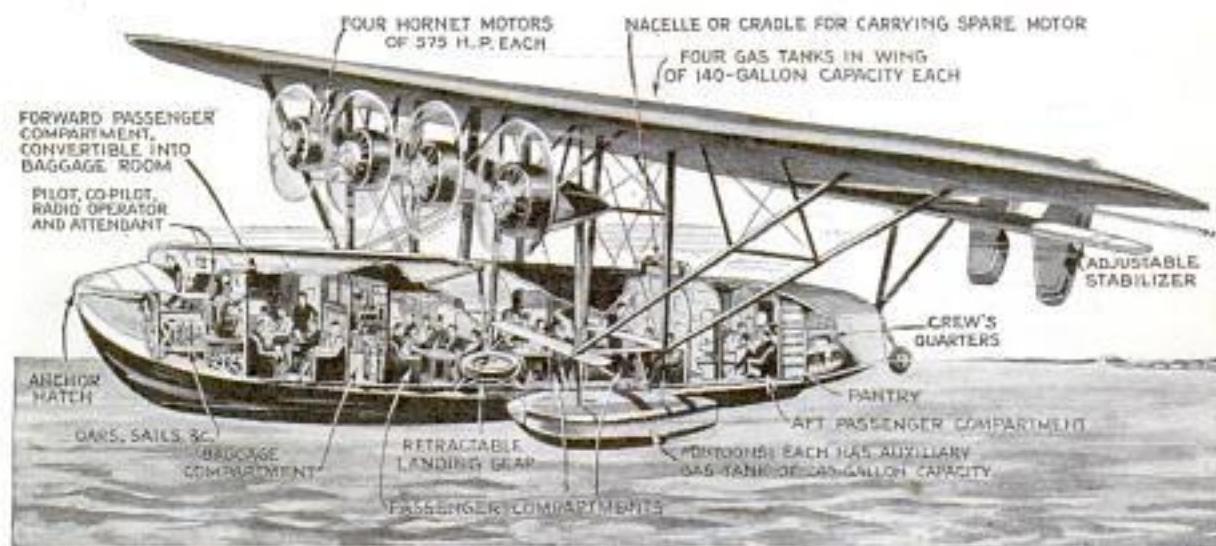
*forged steel products
newark, Pa.*

a127
New York Times 6/7/31

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POPULAR MECHANICS

This Seagoing Air Liner Is Like Clipper Ship



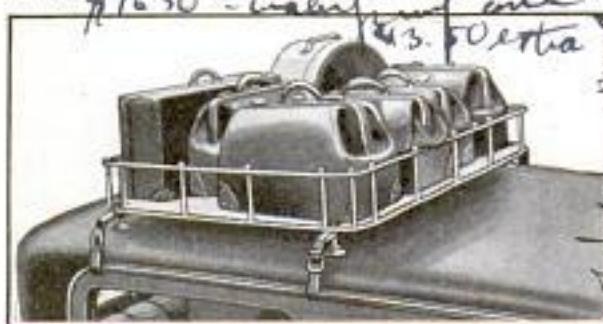
Sectional Drawing of World's Largest Amphibian Which Resembles a Water Craft as Much as an Air Liner; Note the Retractable Landing Gear and Space for Carrying a Spare Motor

Resembling a fast clipper more than the conventional type of airplane, the world's largest amphibian, and one of the largest planes of any sort, recently was completed by the Sikorsky company. This seagoing air liner will carry forty passengers and is to be used, with similar craft, by the Pan-American Airways for the long water jump from Cristobal to Jamaica. The ship has the high-prowed metal hull and the beam and comfortable interior of a roomy cabin cruiser. Its hull is fifty-eight feet long, the wing span is 114 feet and the over-all length is seven-

ty-five feet. Its four motors, cradled abreast in line beneath the big monoplane wing, develop 2,400 horsepower. Empty, the ship weighs 19,000 pounds, and fully loaded and equipped, the craft is expected to get off the water with 30,000 pounds. Wing and pontoon tanks have a fuel capacity of 1,025 gallons, sufficient for a 1,000-mile cruising radius with sixteen passengers and a crew of four, besides an express and mail load. For a 500-mile flight, the ship is intended to carry her full complement of passengers in addition to baggage and mails.

LUGGAGE CARRIER ON AUTO TOP UTILIZES WASTE SPACE

a132
Waste space on top of automobiles can be utilized on tours by attaching a luggage carrier that fits on the roof. Installation is made without damaging the top, since there are no bolts or holes through



Luggage Carrier for Top of Automobile Rides on Vacuum Rubber Cups and Attaches to Molding

the deck. Adjustable supporting legs of the carrier are tipped with rubber vacuum cups, carrying a capacity load of 600 pounds on a cushion of air. The vacuum-cups are the only parts touching the top. Webbed straps fastening to loops attached to the top inside of drip molding hold the carrier so that it cannot shift.

COKE RUNS AUTO AT LOW COST

Coke has been tested successfully in England as a fuel for automobiles, and a penny's worth has been found to run a car ten miles. The fuel is in the form of small coke which generates gas in an apparatus mounted on the running board. A truck ran eighty miles at thirty miles an hour on fuel costing less than a dime.

*Bellevue Htg Co.
Bellevue, Ohio*

Mrs. N. Clarke Jones

No commercialized material

*and I saw
Kreuchenberg*

91294

POPULAR MECHANICS

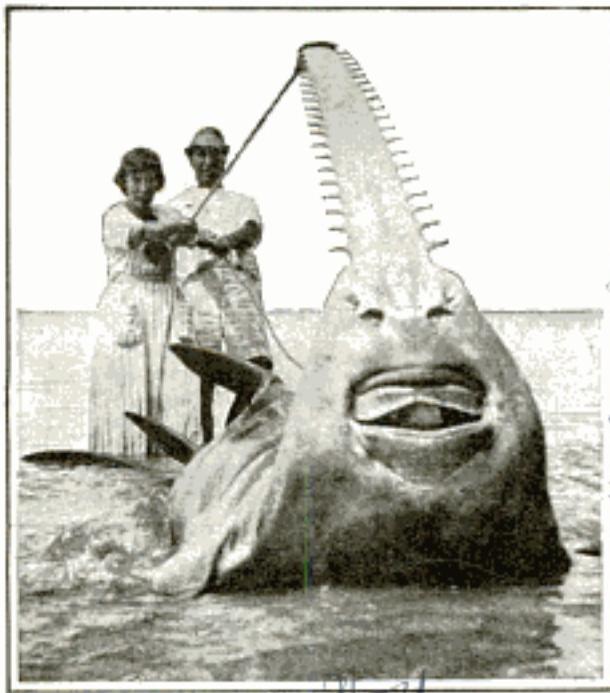
385

"RAIL ZEPPELIN" BEATS RECORD OF FASTEST TRAINS

My June 6/22/31
Running over a regular commercial route for the first time, the German "rail Zeppelin" established a world's record for speed by flashing from Hamburg to Berlin in one hour, thirty-seven minutes and forty-five seconds. The distance is 173 miles and the average speed was 106.31 miles per hour. At times, the propeller-driven car reached a speed of 143.75 miles. The engineer kept on schedule all the way. Gasoline consumption of three and a quarter miles per gallon was considered reasonable. The demonstration brought out that railway signals must be spaced farther apart if the land Zeppelin comes into use, so fast did the car travel. A test with pieces of paper laid on the rail showed very little draft from the propeller.

GIANT SAWFISH TOWS YACHT FIVE HOURS IN FIGHT

Towing the sportsman's twenty-ton yacht five hours before giving up the struggle, a giant sawfish was captured recently off the coast of Panama by F. A. Mitchell-Hedges, the explorer. The fish weighed 5,700 pounds and was thirty-one feet long.



Giant Sawfish, Thirty-One Feet Long, That Towed a Twenty-Ton Yacht for Five Hours



Cut-Out Sign Depicting Basket of Fruit on Roof of Roadside Market to Attract Motorists

FRUIT-BASKET DISPLAY ON ROOF ATTRACTS SHOPPERS

One roadside fruit market in New England attracts the attention of passing motorists by means of a big sign on the roof, depicting a tempting basket of various kinds of fruit. It is of painted wood, cut out around the edges to present a more realistic effect and can be seen by approaching drivers a considerable distance.

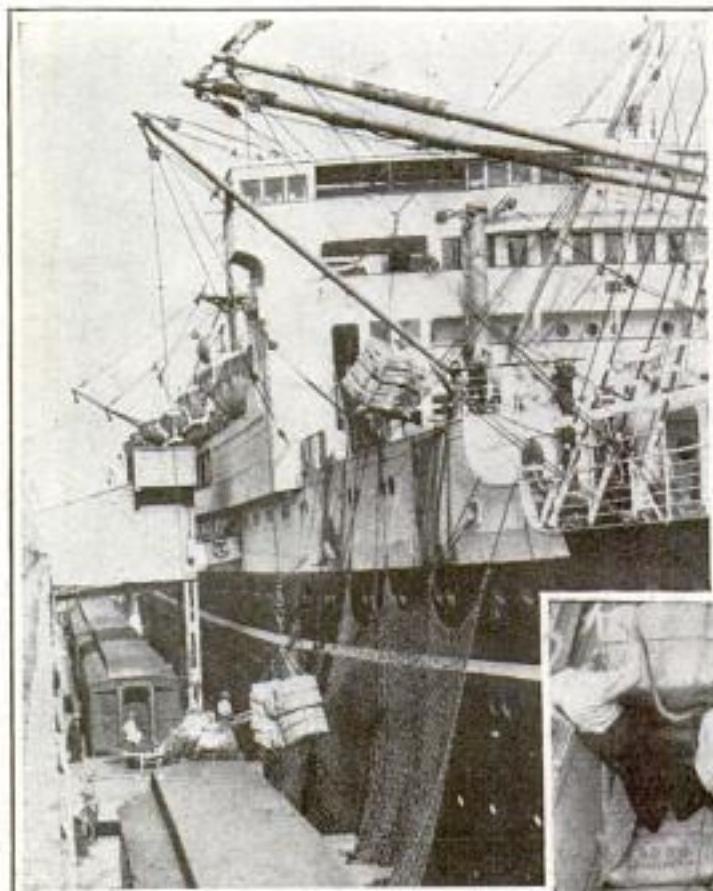
FLEXIBLE WROUGHT-IRON PIPE

Wrought-iron pipe that bends around corners has aided in simplifying plumbing problems, particularly in repiping old buildings. It can be bent to a center-to-center diameter as low as three and three-tenths times the external diameter of the pipe. Thus a one-inch pipe with an outside diameter of 1.315 inches can be bent into a circle segment having a diameter of 4.33 inches without damaging the material. The pipe can be threaded, welded or handled like ordinary piping.

*A. M. Byers
Clark Blodgett
Pittsburgh
Copyrighted material*

Cont. Photo 5/33 3 Province St. Glens Falls

A 1257 Right of Way Is Given to Millions in Silk



Above, Transferring Silk Bales from Ship to Train; Right, Looking Down into the Hold

Four million dollars worth of silk for American consumption in one shipment! Such was the staggering aggregate when 6,140 bales were landed recently at a Pacific coast port. It was by far the largest shipment to be sent across the Pacific this year. The size of the cargo was due to the release of vast stores of raw silk in Japan, which had been held up because of over-production. The shipment was trans-



Uncle World
spells the difference between profit and loss to the sellers and purchasers.

PLANETS RULE EARTH'S RAIN?

Planets, instead of sunspots, are held responsible for the wet weather cycles on earth by Halbert F. Gillette, civil engineer and former university professor. His theory is that both the sunspots and the heavy rainfall are caused by planetary conditions. He has found that the magnetic cycles of the planets line up in perfect agreement with the clay deposits in

Colombia

geological formations. The thickness of the layers indicates the amount of clay deposited year by year in a given formation, and that in turn testifies to the relative amount of rainfall running over the drainage surfaces. It has also been found that the thickness of these layers corresponds to the relative thickness of rings shown in cross sections of sequoia trees, which also indicate rainfall year by year.

San Marino, Calif.

by Gerald Greene
6/2/31

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Att. Cont. R. S. Thackwell
4649 Beverly Blvd
Los Angeles Calif

Your Dream Castle in Soap!



A Triumph of Model Making

CARVED out of large cakes of white soap, exact miniature models of architectural and landscape projects are made by McKown and Kuehl, Beverly Hills, Calif., landscape architects and town planners. They have found that this practice is a convincing demonstration of just how a project will appear when it is completed.

Working from a preliminary plan, they recently carved out the model of a thirty-five-room house with terraced landscape, to the scale of one inch to twenty feet. For this task they required sixteen cakes of soap, nineteen tiny green rubber sponges, some small tins of paint, some shellac, a piece of wallboard, four feet by eight feet, two dozen small buttons, some pins, half a handful of tiny pebbles, ten pounds of plasteline modeling clay, a few sheets of sandpaper, a small mirror, some toothpicks, cellophane paper, nails, hot water, string and a pair of scissors.

After making the preliminary plan and a contour map of the property to show the exact topography, they were ready for the first step in the making of the

Completed Castle on Scale of One Inch to Twenty Feet; Below,
Fashioning Trees from Sponge Rubber

soap home. Having agreed upon the scale, they made a wooden frame on which was nailed a sheet of wallboard to form the base of the model. Then they cut up sections of wallboard to reproduce the exact contour lines giving shape to the property. These sections were placed one over another, and when this was completed, the base represented, roughly, the shape of the landscape. This was covered



with shellac to prevent moisture from distorting it. The second step was to fill in this rude base and smooth it out by use of plasteline, a sort of modeling clay. Special instruments for this task had to be designed by the architects because it was found that those used in clay modeling would be entirely unsuitable, since they required very sharp ones to fashion exact detail in their work.

After the entire base was completed, large bars of soap were sandpapered to make them perfectly smooth, so they would fit together with exactness. Then they were held in warm water a few minutes, to make them stick together. These larger blocks were stood on end or cut in halves by use of the old trick of passing a taut string through them.

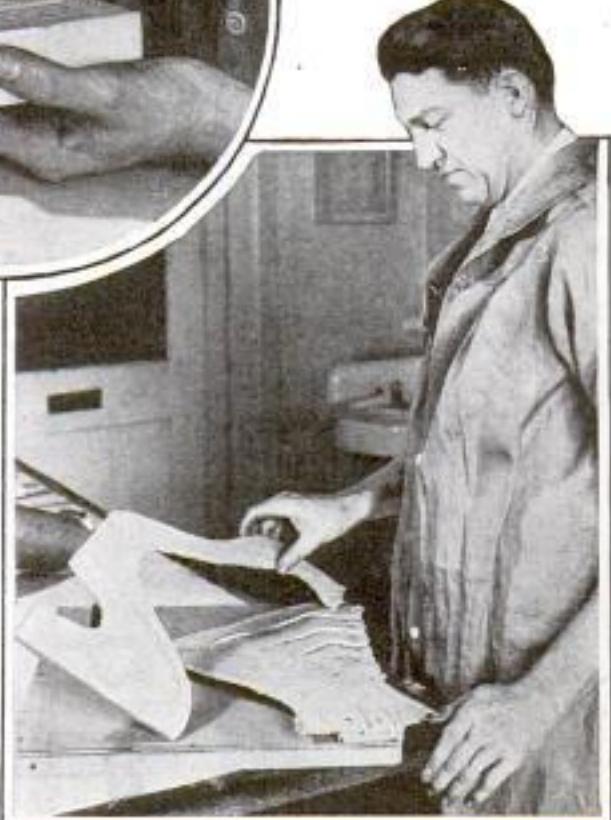
Each unit of the model was carved separately, and the sections were placed together in much the same manner as children build up structures from their play blocks.

Upon completion of the soap house, they fashioned the garden and other ap-

pointments out of soap and other things, and then covered the soap portions with shellac to prevent distortion from possible shrinking or expanding.

For trees, they fashioned tiny miniatures to scale by dexterous use of scissors on little green rubber sponges, which were found to be preferable to ordinary sponges for trees, as they held their shape better and looked more realistic. The trunks were made from matches or pins.

An attractive garden walk was built from two dozen small buttons which were painted. Sandpaper was used for roadways and pebbles represented rocks.



The Roofs Are Painted with Water Color; Toothpick Dowels Hold the Soap Blocks Together, and the Base Is Made of Wallboard

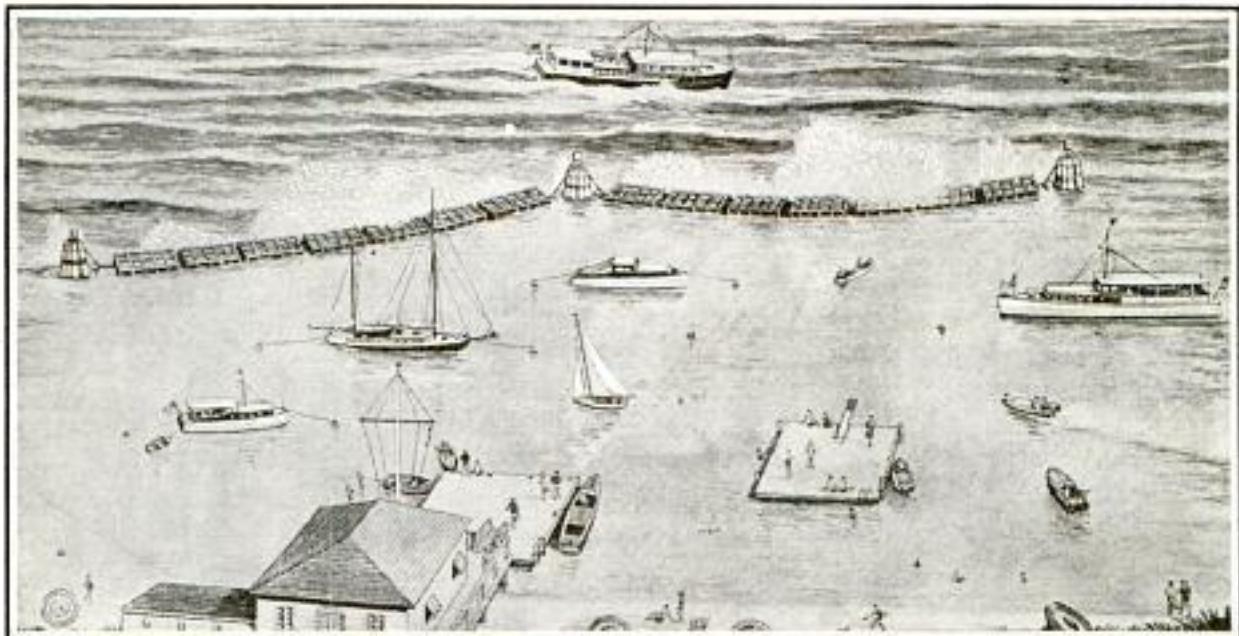
Walsh, Bugbee Co., due
206 Harrison St.
Trenton, N.J.

a 1248

POPULAR MECHANICS

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This Steel "Train" Saves a Harbor in Storm



The Floating Breakwater Applied to a Shelving Beach, Making a Safe and Snug Harbor for Yachts and Smaller Craft Where the Natural Bays Are Missing

Composed of a series of thirty-foot sections, coupled together like a "train" of cars, and moored to a series of seven-pile dolphins, a floating steel breakwater has been developed for coast districts where no natural harbors are available. As many of the trains as are needed to protect any given area may be added by merely placing more dolphins. Each section of steel is kept afloat by two pontoons, between which a bulkhead extends to within a few feet from the bottom of the harbor. The completed sections have the effect of a "loggy" vessel or floating iceberg, with too little buoyancy to ride the top of the waves, yet sufficient rigidity to break the chop of the sea.

SNAP-ON PARACHUTE FOR NAVY SOUGHT AS AID TO SAFETY

Development of a snap-on or quick-connector type of parachute is under way at the bureau of aeronautics, department of the navy. This type is intended for use of passengers, machine gunners and other personnel who would be handicapped if required to wear the equipment continuously during flight. Only a harness would be worn with the type being developed, the parachute being stored in a convenient place. In emergencies, only one

motion would be required to snap the parachute to the harness, or snapping it off when landing in water.

DRESSING TENT HANGS ON AUTO FOR BEACH CHANGES

Instantly adjustable to the door of an automobile, a "bathhouse" that is collapsible and can be carried to and from the beach has been placed on the market. A simple bracket attaches a square tent to the car door. The tent is entered from the corner and is fitted with fasteners. It is floored and has pockets for clothing and towels inside, accommodating four persons. It cannot be dropped or raised while occupied, and, while bathing, may be locked in the car, clothing and all. The bracket cannot be removed while the door is locked. *put up* *erestent*



Dressing Tent That Attaches to Door of the Auto, Making Portable Bathhouse for the Car

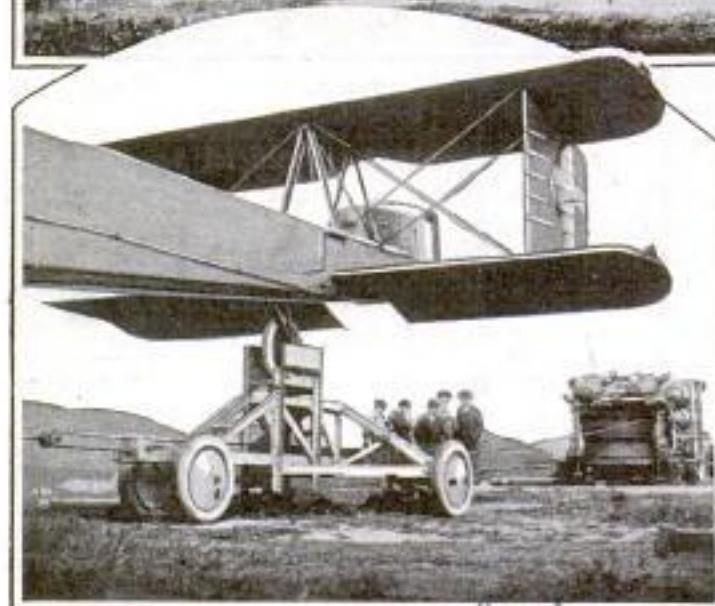
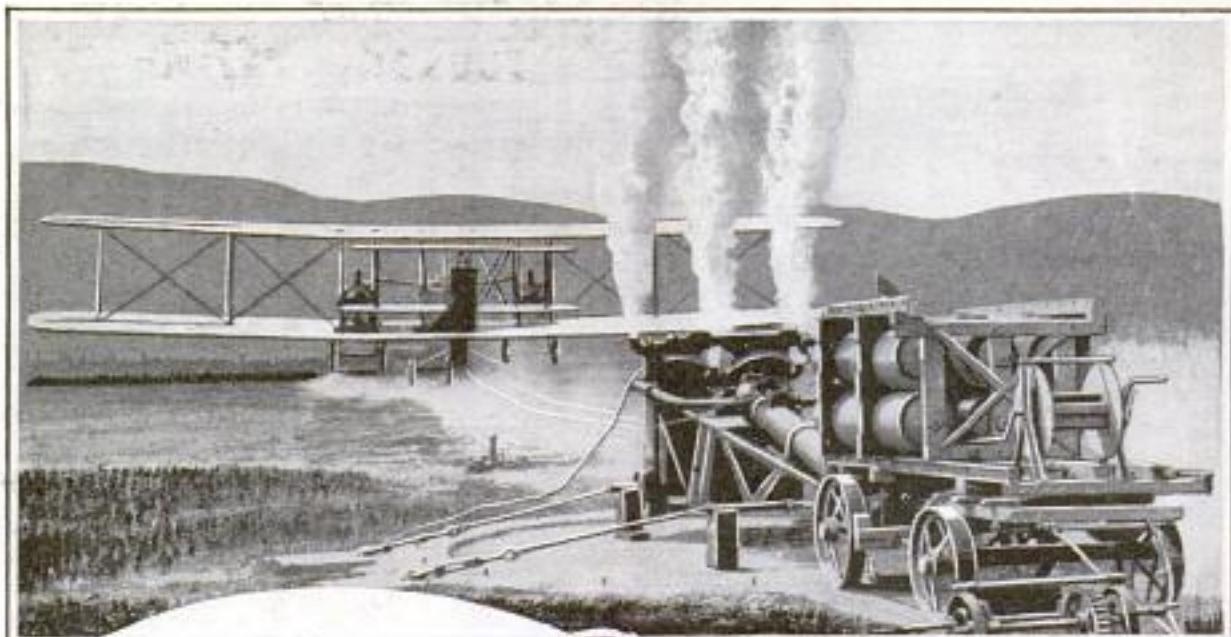
MS: Morley 6/23/31

Kalamazoo Specattes,
white Road material
Kalamazoo bush

Sales Office: 4 W. 35th Street, New York

a 1186

Land Catapult Launches Big Bombing Plane



Operated by compressed-air cylinders of 3,000 horsepower, a land catapult in England is able to launch a twin-engine bombing plane weighing seven tons into the air at sixty miles an hour in a few seconds. In principle, it is the same as a ship catapult, but the operation is reversed, the craft being pulled instead of pushed into the air. The bomber is poised on a special carriage connected by a steel cable to a large drum at the rear of the catapult. The cable is wound on the drum by a compressed-air engine that runs at a top speed of 2,400 revolutions per minute. The engine and drum are mounted on an anchored car. When the airplane carrier

Catapult Which Launches a Seven-Ton Plane; Unlike Ship Catapults, It Pulls Plane into Air, Instead of Pushing It

is about 150 feet from the car, the drum is slowed down automatically, the momentum acquired by the ship being sufficient to throw it into the air. By such a method the take-off run is reduced about nine-tenths.

WEIGHING A SPECK OF INK

Adding "inois" to the abbreviation "Ill." in addressing an envelope to a city in that state, increases the weight of the letter. Balances, which weigh accurately to one one-millionth gram, show the ink in "inois" weighs five ten-thousandths of a gram. Or more simply, in a matter of 56,000 letters, the total would weigh one ounce more if Illinois were spelled out.

GAS TO STOP PLANES

Fighting planes in the next war may be brought down from the skies, their motors disabled and their pilots helpless to land beyond the usual gliding distance, through use of a gas discovered in Germany. Fumes of the gas, the discoverers claim, will stop airplane motors at once.

Prof. Karl Hofmann.
Institute of Technology
Berlin, Germany.

6/27/31

Mr Edna & Lamina 1296

W. J. Cincinnati

POPULAR MECHANICS

39

SECOND GUESS BETTER THAN FIRST ONE

Your second guess is likely to be about twice as good as the first, and it pays students to think twice before recording their answers in college examinations. This fact has been revealed by submitting "true-false" questions to more than 1,500 students, from which it was found that the chances are about two to one that the second answer will be the correct one. It also pays to be dubious, and it is much safer to change a judgment from apparent true to false than vice versa.

SWIMMING MACHINE HAS PEDALS LIKE BICYCLE

Even a novice can propel himself through the water faster than an experienced swimmer on a water bicycle supported on pontoons and driven by a propeller operated by pedals. The swimming machine is safe and stable, allowing the operator to rest at will, to float or to steer it without fear of sinking or overturning. The occupant lies, face down, in a natural swimming position on the bicycle which is adjustable in length. By removing one bolt, it can be dismantled for convenient carrying.

This Man Is Painting Candles by Hand after Making Them by Hand-Pouring, a Method That Has Almost Vanished

"LAST OF THE CANDLE-MAKERS" HAND-PAINTS HIS WARE

In the old Spanish quarter of Los Angeles is to be found the last of his type, the hand-maker of candles. Jose Herrera clings to the century-old method of hand-pouring and painting, and turns out hundreds of the crudely picturesque candles of all sizes that are to be seen almost solely in Mexican churches.



Swimming Machine That Rests on Pontoons; It Is Driven by a Propeller That Is Operated by Pedals

miami Water Bike Co
miami, Fla



Los Angeles - June 27, 1931
Herrera, Jose, Los Angeles

BENZOL VAPOR USED AS STEAM

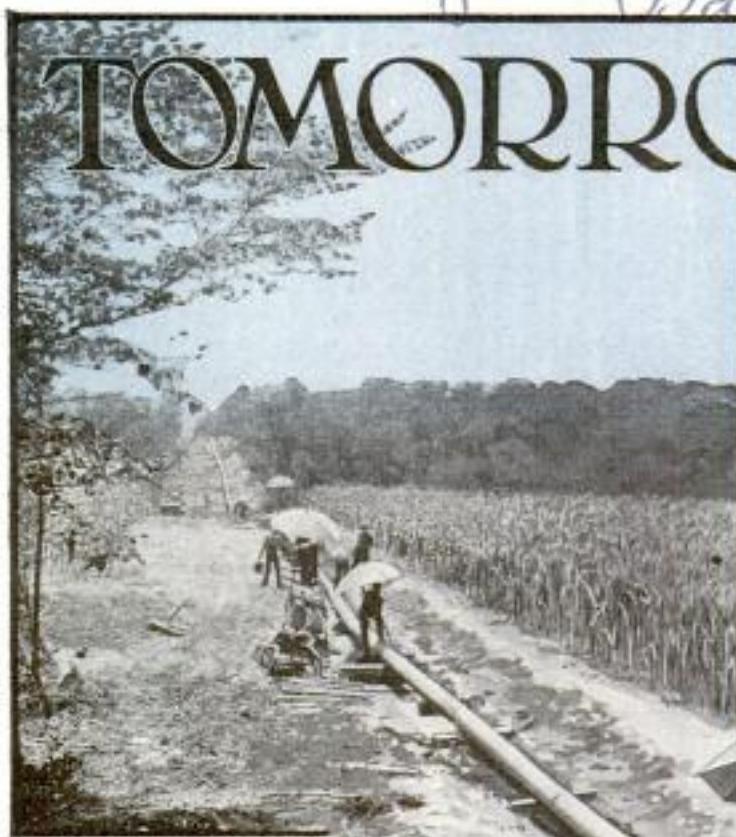
Benzol, mixed with water, will reach the condensation or steam point at the low temperature of 69 degrees centigrade instead of 100, a Hungarian experimenter has discovered. The difference in amount of heat necessary to produce steam with the mixture would mean an annual coal saving of \$625,000,000 in Germany, it is estimated. The experiments have been carried on in Hamburg, whose scientists say efficiency of the low-temperature steam is as high as that of the 100-degree product.

Arnold Czengyi
at Hamburg Institute
of Energy Research

Cont. H.C. McLord, 2720

Maryland Ave,
Baltimore, Md

TOMORROW-The



NOW appears a new giant which aspires to the grueling task of carrying the weighty burdens of the world. Another creation of man steps forth, shoulders a large block of the freight of the mightiest of nations, suggests that it might take on the whole job. Sinuous steel-pipe lines, already bearing vast quantities of liquid freight, are prepared almost to make a bid for the carriage of solids.

After generations of furnishing man's favorite transportation, the railway has been assailed by one rival after another. Motor trucks have taken much short-haul business, but also contributed as a feeder to railroad business. But now appears this new competitor, which has reduced the oil carried by the roads nearly 6,000,000 tons.

Next, the coal business, which is said to have been losing ground to natural gas and oil largely because it has been less enterprising than its cousins, is considering the efficiency of powdered coal and its transportation by pipe line. And the transportation of wheat in the same manner seems equally logical.

Pipes and air pressure are applied to

the loading and unloading of wheat, to its journey through the mill from grain to flour. Just as the transfer of mail bags from one post office to another in New York City long has demonstrated the principle of solids so transported, so has the handling of wheat at the mill proved the possibilities of conducting it through pipes.

Coal costs a dollar a ton at the mine in Illinois and \$4.50 a

Welding the Joints of a Georgia Pipe Line; a Tractor Hauls the Equipment through the Cane

ton at the factory in Chicago, St. Louis, Milwaukee or Indianapolis, 200 or 300 miles away. Similar divergencies exist between coal at the mines in West Virginia and coal at Pittsburgh, Baltimore or Cincinnati. Nearly eighty per cent of the cost of that coal is due to transportation charges. Those who are wise to pipeline possibilities hazard a guess that this coal could be delivered by that method at \$1 a ton as compared with \$3.50.

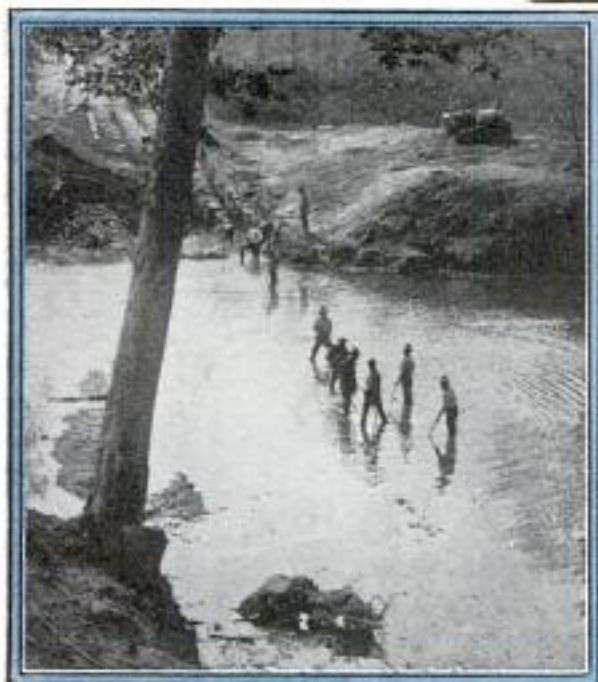
Construction of pipe lines that are able to function as conduits through which freight might be conveyed, is a recent de-

91070

Underground Railway!

velopment. It has come about through an improved means of welding steel, for freight pipe lines must be smooth, air-tight and strong. No cast iron with cemented joints for this work. But the right sort of pipe now has been developed and strings of it, twenty-four inches across and 500 miles long, already are in operation.

The old scheme of welding was based on the blacksmith's principle of bringing two pieces of steel together in a heated form and hammering them. This was all right provided the two parts



Laying the Pipe through Water and Swamp; Above,
a Joint Is Welded on Twenty-Inch Line

could be sufficiently worked together. But the joint was likely to be weak and clumsy like edges of pie crust lapped over for the baking. The masterstroke came when it was found that two edges of steel brought together could be united with an electric arc, much as the housewife sews



Courtesy Lincoln Electric Co.

a seam with her machine. The joint now is the strongest part of the pipe.

Having its couplings, the oil industry came back to the pipe people with a request that called for a most startling application of the possibilities of arc welding. It wanted the equivalent of one of these couplings, but it should be five feet across, thirty feet long, and its walls should be two and one-half inches thick. They would put heads on it and have a vessel that would endure higher pressure than any other in the world, and do a big business in cracking crude oil into gasoline under heat and pressure, which was what they were looking for. Yes, the steel people said, that might be accomplished—and they did it.

As a result of these advances, there are today 90,000 miles of pipe line in use. Last year more than 15,000 miles of gas

9/10/70
lines were added at a cost of approximately \$400,000,000.

Big business is concentrating on natural gas just now not only because of the expectation of a nationwide network of giant pipe lines, but because new and important uses for the fuel have built a \$5,000,000,000 industry around it. More and more it is becoming a rival to the oil industry, one good reason being that quicker and cheaper conveyance of gas to market is now possible.

Among the miscellaneous industries that utilize natural gas as fuel are steel and glassworks, cement plants, cotton gins and presses, chemical works, sugar refineries, salt works, bakeries and sulphur mines.

The gas has been used by steelmills, notably in the vicinity of Pittsburgh, for many years. The ease of temperature control makes it particularly adaptable for use in melting and in the heat treatment of metals. Natural gas is practically free from sulphur, and this quality is of prime importance in the manufacture of steel and glass. The even temperature obtained with gas results in fewer "seconds" and rejections. The freedom from soot makes gas an ideal fuel for use in bakeries.

Another indirect use of the gas, little

ribbons and phonograph records. But by far the most important and largest-scale use of carbon black is in the making of automobile tires. A small amount gives two or three times as much wear to tires.

Even bridges of a new type are beginning to dot the United States because of problems encountered in the building of pipe lines. In several instances, the old plan of laying pipe lines under water in crossing rivers has been discarded in favor of bridges intended for no other purpose than carrying the heavy gas mains. Some of these bridges are of the suspension type and are as impressive in appearance as railway and highway structures. From these designs, the types range to old-fashioned truss bridges and even to simple supporting trestles. In all cases, however, they are for pipe lines exclusively.

The method of laying pipe lines along the river bed had its disadvantages because of the difficulty of maintenance. To



Courtesy Caterpillar Tractor Co.

Three Sections of Eight-Inch Gas Pipe Are Laid through Hills and Mountains near Fresno, Calif.; Wherever Possible, the Trenches Are Dug by Tractors

known to most, is in the making of carbon black, a pigment manufactured by directing the natural-gas flame onto a metal surface. This finds a market in the making of inks, carbon papers, typewriter

insure constant flow of gas and to minimize costly repairs, the pipe-line bridge was introduced. The success of the pioneer structures has caused the bridges to multiply in surprising fashion. And the

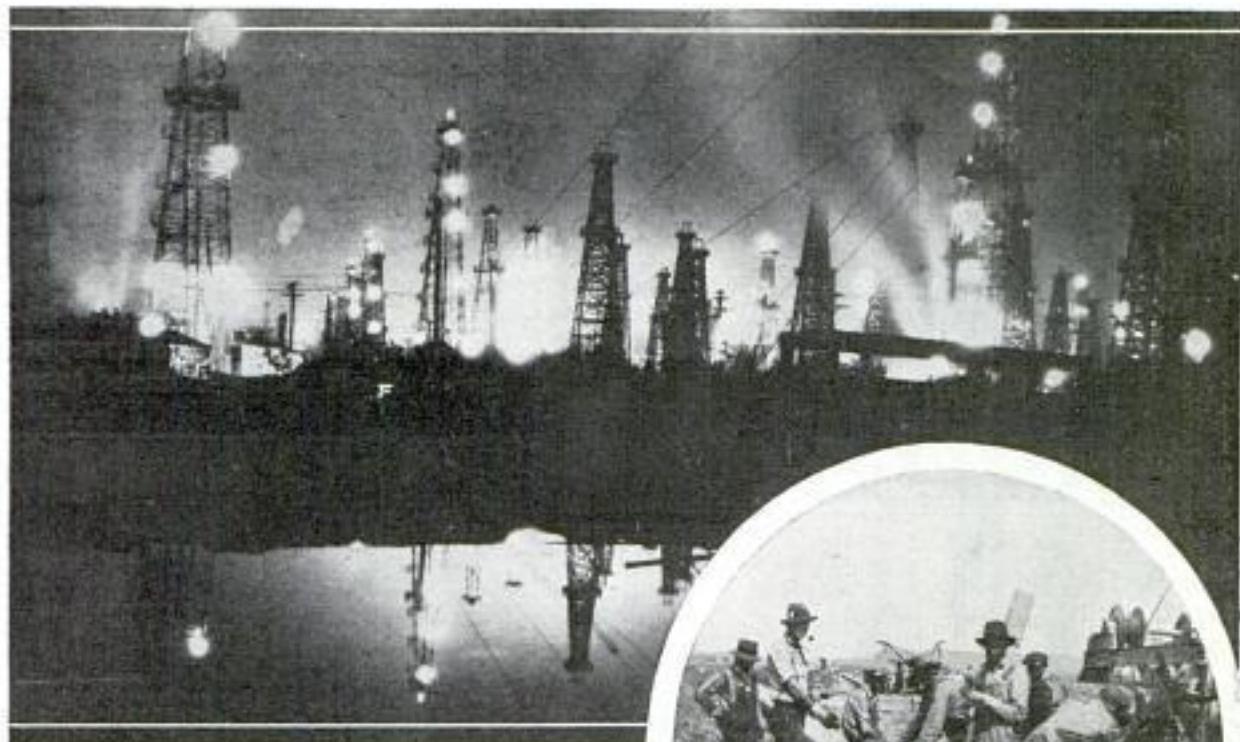


Photo by Ewing Galloway

Oil Derricks at Night Reflected in the Sump; Right, Burning Tires Heat Pipe for a Bend

end is not yet. Still bigger accomplishments are in the offing. Another stupendous stride in gas transportation is about to be made. Panhandle gas is to be sent direct to Chicago through an unbroken steel tube. The distance is 1,000 miles. Two lines are to be laid at a cost of around \$3.50 a foot. Here and there along the line, booster stations will function, pushing the gas ahead and pulling that behind. This perfect, ashless fuel must be made to hurry through these steel channels if it is to supply an empire.

Poles supporting telegraph wires follow the line. There are track walkers, maintenance-of-way staffs, emergency crews in case of washouts, just as there are along railroads. There are problems, such as electrolysis, that are not to be met in railroad maintenance. Electrolysis bites into the pipe more deeply than rust and destroys it. Paint will not keep it out. It is due to stray electric currents that pass through certain soils known as "hot spots." Instruments have been devised to detect them and methods have been developed for diverting them. This sort of transmission has its own problems.

Tendencies in the laying of pipe lines at present are away from the coating of the pipe for its entire length, and toward

protection only in soils where chemical hot spots exist. In most corrosive soils the action of the chemicals on the metal pipe sets up an electric current just like that in a dry or wet battery.

In a recent government test of a dozen pipe lines, a measurable amount of electricity was found flowing through every one. It was found the current was increased in corrosive soils, or hot spots, and decreased in normal areas. The action of electrolysis, however, is most injurious where the current leaves the pipe. It was also found that the current left the pipe more rapidly in soils of low electric resistance. At these points the corrosion was particularly marked.

To simplify the location of these low-resistance areas, a simple piece of apparatus was developed that looks like two walking sticks, one with a milliammeter mounted on top and the other equipped with a small flashlight battery. Each rod is tipped with metal. By measuring the apparent resistance between the two ter-



minals, the approximate resistance of the soil can be calculated.

This instrument makes possible rapid tests along a pipe line, or along the right of way of a projected one, and the results with this testing device are sufficiently accurate for all practical purposes, provided the soil is not too dry.

Concrete covering for the pipe is employed in many hot-spot areas, and an interesting new machine has been developed for this work. If the concrete is too soft, its porosity is too great after drying, so the concrete for pipe lines must be worked while in a very stiff state.

In order to apply this covering, a vibrating machine is employed, which shakes the concrete into every nook and cranny around the wire reinforcing material. Also, it has been found that, by using the vibrator, more of the crushed stone and less cement, which is more costly, can be worked into the mixture, thus effecting considerable economies in the coverings for hot areas.

A curious factor in the California climate is that of temperature changes as affecting pipes laid on the surface of the earth. To offset these conditions, it is necessary for the welding to be done in the early morning or at night when the line is contracted by the cool air. Welds made during the heat of the day are sub-

jected to severe tension under the nightly contraction, with possible resultant breaks.

Systems of transportation are here being worked out that are on the eve of startling developments. Wherever natural gas goes, of course, the necessity of hauling coal decreases. Then there is the stupendous urge that this improved pipe is giving the transportation of oil. Long-distance gaso-



Difficulties of Pipe-Laying in the Blue Ridge, at Top; Bridge, 2,522 Feet Long, Built Only to Carry Pipe in Texas

line lines are being laid in all directions. When there are two points fifty miles apart, and gasoline must be carried from one to the other, the cost by rail is likely to be around fifty cents a barrel. The same gasoline can be carried the same distance through a three-inch pipe for four cents a barrel.

1434 SALT WATER HELPS GOLDFISH

Salt water has been found an effective remedy for ailing goldfish. These fish sometimes float on their sides on top of the water or otherwise act unnaturally, and a white fungous growth often can be seen on their bodies. In such a case, a tablespoon of salt should be added to a quart of water and the fish placed in the solution for two or three minutes, then transferred to a bowl of fresh, cool water. The treatment is continued until the fish act naturally.

James H. Burdett, Director
National Research Bureau
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Frank Newell
May 1/31
**Supermarine
- Rolls Royce
Biplane**

**PLANE FOR ATLANTIC
SERVICE** a 1343

Twenty passengers will be able to fly across the Atlantic in Britain's giant air liner, which will be launched in the spring. Power and fuel capacity for a non-stop flight of 2,300 miles have been provided. Forty passengers can be accommodated on a 1,000-mile flight. The captain and pilot will navigate the ship from a bridge constructed over the passengers' cabins, and six motors will drive the plane at a maximum speed of 145 miles per hour.

**BIKE MEASURES OXYGEN
USED FOR EXERCISE** a 1260

W. M. Miles
Subjects of a laboratory study conducted at Yale on the influence of mild intensities of work on various types of persons, are set to work pedaling a stationary bicycle. They wear a mask connected to a bellows, which rises and falls with each complete breath. As the exercise continues, the oxygen in the bellows becomes less and less in volume, causing the bellows to inflate to a lower level at each breath, and so plot the breathing line on a drum attached to it. The subject of the test plots one curve while at rest, then another while riding the trick bicycle. The difference between the two lines shows how much oxygen is used at varying bicycle speeds.



Trick Bicycle That Shows How Much Oxygen Is Used Doing Certain Kinds of Work

*Prof. W. M. Miles,
Institute of Human
Relations*

John L Comby
a 1102
Cont. John L Comby

POPULAR MECHANICS

397



Forester Using the Increment Borer to Determine Life History of a Tree, and Samples of the Borings

**AGE AND HISTORY OF TREE TOLD
BY BORING IN TRUNK**

Virtually the entire life history of a tree can be extracted from it by the scientific forester with an increment borer, a tool which removes a plug, or cross section, from the trunk. The boring, when removed and closely examined, shows all the vicissitudes that a tree has encountered, its age and its yearly history. The growth can be measured and progress charted in terms of annual rings in the wood. The borings even show something of soil and climatic conditions, as well as of fires and the fight between trees of different species for existence.

ANOTHER CAVERN ELEVATOR a 1376

In operation for a considerable length of time, an elevator runs from a hotel above the Shenandoah caverns in Virginia to the floor of the caves. The elevator was built after a shaft was cut through solid limestone and is employed each year by thousands of tourists to the cavern region. This lift antedates the 750-foot elevator now being constructed at Carlsbad cavern in New Mexico.

Cont. R. S. Dady,

153 N. Main
Woodstock, Va.

June 1931-963

*Pacifc Northwest Forest Service
Forest Service Laboratory*

a 327

Ivory—from Elephant Tusk to Billiard Ball



Weighing, Sorting and Working Ivory; Modern Machines Have Replaced Hand Methods of Cutting and Carving It into Ornaments

Elephants' tusks still provide the world's ivory supply, but modern tools have replaced the hand methods of cutting and carving the material into ornamental forms. Antwerp is the world's largest ivory market, but is closely rivaled by London and Liverpool. The usual tusks are eight or nine feet long, and a pair may weigh all the way from twenty-five to 500 pounds. They are yellow or brown outside but pure white inside. Seen in cross section, ivory has lines of many colors, the compact cells being filled with a waxlike material that gives to worked ivory its high polish. Experienced workmen have charge of cutting the tusks into sections of the desired lengths, and special saws are required to work into form the individual pieces. Aside from

years ago ivory from Africa was sold in Egypt and built into thrones of kings.

GOLD-PAVED PLANE RUNWAY

Airplanes are used in Mexico to carry bars of silver and gold from the mines at Tayoltita and, because of the inaccessibility of the mines, the ships are forced to land on a mountainside. The runway for the planes is 1,500 feet long and 140 feet wide, its surface representing the most expensive runway in the world, for it is made of surplus workings from the mines and has been estimated to contain gold and silver worth \$500,000.

More than 21,000 acres were planted to trees in the national forests in 1930.

Corporación Aeronáutica
de Transportes - SA
Torreón, Coah. México

Science Service
534-J. 6/20/31 a 1155

a1399
**SECRETS OF ANCIENT AMERICA
HUNTED IN GRAVEL PITS**

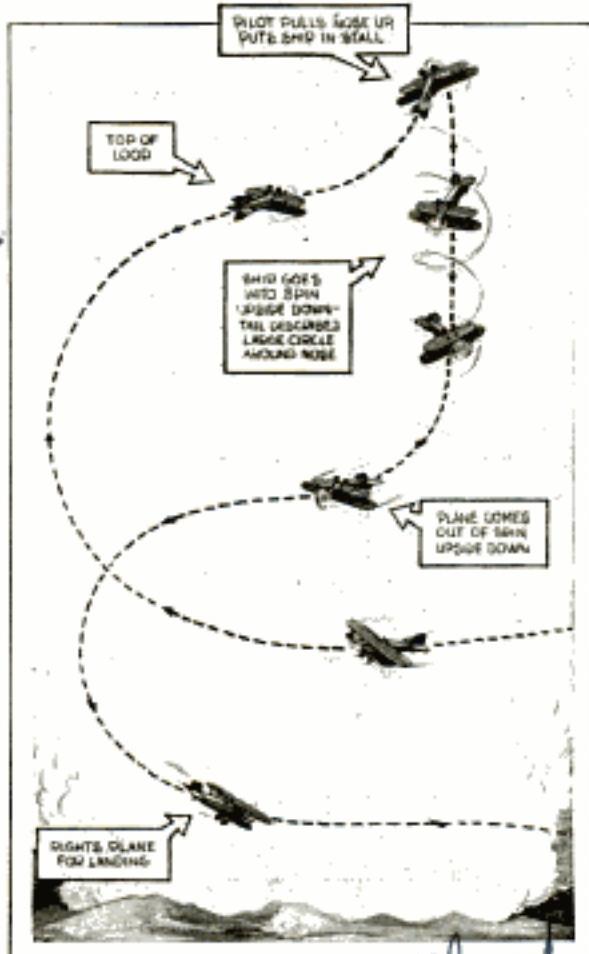
If you find a stone arrowhead or a chipped-flint ax buried deep in a gravel bed, leave it there until scientists have had a chance to examine it. Dr. M. M. Leighton, chief of the Illinois state geological survey, advises finders to leave relics just as they are found, for the way the arrowhead or flint ax lies in its burial place may help telling who made it and how long it has been there. Gravel pits may hold evidences of prehistoric life in America. Doctor Leighton says in urging that workers be instructed to report and leave guarded all relics found in excavations until scientists from the National Research Council at Washington can examine the discovery and decide on its significance. Surface finds of Indian or other remains have little archaeological significance. But a genuine find of articles buried under obviously undisturbed gravel may be of great importance.

91196
**BARREL ROLLING IS MADE EASY
WITH HANDLING TOOL**

Handling of barreled materials is simplified with a tool recently developed. It is placed over the ends of barrels or steel drums, and, when pulled toward the operator, claw points are engaged and locked automatically. The handles are arranged to allow the pointed ends to revolve, so that barrel or drum may be rolled along the floor. The grip is loosened by releasing a ratchet on the handle. The tool is made of wrought iron.



Barrel Handling Is Made a Simple Matter with the Speedy New Tool Shown Here



clerk
How the Inverted Spin, a Stunt That "Can't Be Done," Was Completed by Youthful Pilot

**STUNT THAT "CAN'T BE DONE"
ACCOMPLISHED BY YOUTH**

Another of the air stunts that "can't be done" was crossed off the list by Robert Brahm, young Los Angeles flyer, who safely completed an inverted spin. He started a loop at 5,000 feet, and, while upside down, nosed the plane into a stall. After spinning downward for 3,000 feet, he pulled successfully out, flew on his back and then did a vertical half circle to return to normal flying position.

a 135
JAR BUGS FROM TREES

Adopting the methods of opossum hunters, entomologists of the department of agriculture now recommend shaking insect pests from peach trees. "Jarring sheets" are placed under the trees to collect the beetles of the plum curculio. While four men hold the sheet, another jars the tree limbs with a pole, padded on the end, and the bugs tumble down.

*C. Slovering & Son, Inc. 316 1st Avenue
1375 W. Lake Chicago*

*Copyright material
Washington*



Pilots in a "Flying Barber Chair" Learn to Navigate Blind by Watching Instruments in the Box

"HORIZON IN BOX" HELPS PILOT LEARN TO FLY BLIND

Seated in a whirling chair and looking into a box in which is an illuminated turn-and-bank indicator, airplane pilots are given blind-flying tests at the Los Angeles municipal airport, supervised by the department of commerce. It is the first step in teaching pilots, many of them old-timers who have been flying by eye and ear for years, to fly with instruments, essential knowledge in fog and at night. The chairs are whirled, dipped and put through many other evolutions, which the pilots try to follow and tell in what positions they are by reading the indicator.

BREAKING COAL WITH WATER REDUCES HAZARDS

Coal is broken from mine veins by a hydraulic machine tested in Colorado, eliminating much of the danger in mining with explosives. The machine, which is easily carried by two men, consists of a water tank and hand pump. The pump, equipped with a gauge to indicate pressure, forces water into a pipe running

through a rubber cartridge and so against the coal. Pressure of 500 to 1,000 pounds may be applied to break off the coal in large, clean lumps.

SPIES AND SECRET MESSAGES DISPLACED BY MACHINE

Secret messages now can be coded and decoded mechanically by the use of an apparatus known as a "cryptograph" which does not differ greatly in principle from an accounting machine. It mechanically ciphers and deciphers telegrams, and its operation greatly reduces telegraph tolls through the use of ten-letter combinations or "words." The coding machine is operated from a keyboard similar to that of a typewriter. A special device allows the repetition of any letter or letters, should this be necessary, and a counter controls the number of letters ciphered. The ciphering mechanism for one and the same setting of the key chambers has a period equal to 1,580,000 letters, that is, the same sequence in the substitution of letters will occur only after this number of strokes on the counter thus enabling long messages to be transmitted without changing key members.

The many combinations preclude all risk of the code being deciphered, except by persons possessing the secret.



Cryptograph Which Codes and Decodes Messages; Above, It Is Linked with Typewriter

*Meyer Rotary Engine Co.
Patterson Rd., Denver, Colo.*

a-1373

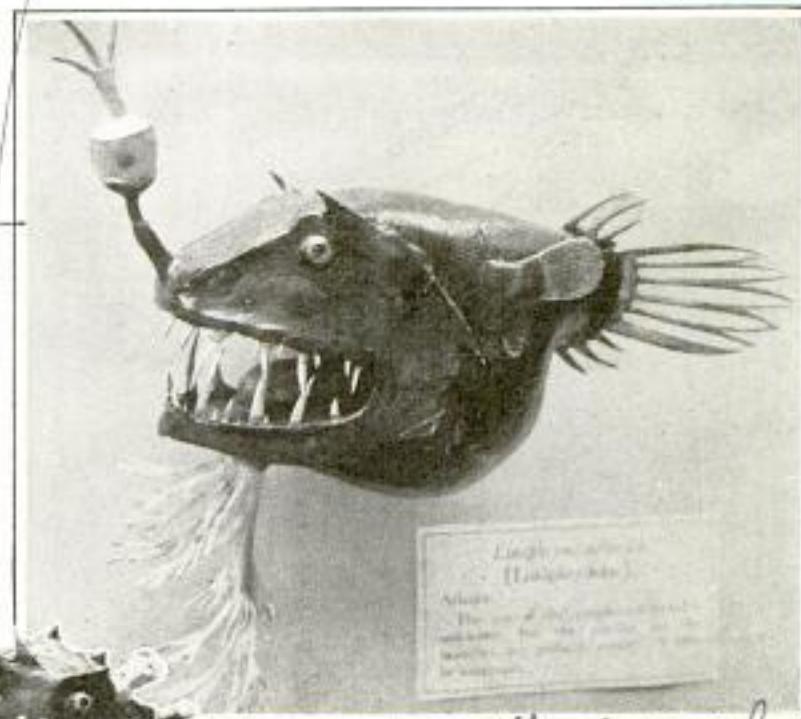
in South Kensington

POPULAR MECHANICS.

401

Fish That Go Angling Are Shown in Museum

Models of two deep-sea fish of the angler family, both equipped with ferocious spines on back and head and long saberlike teeth, have been placed on view at the British Museum. One of them, the female Photocorynus spiniceps has her home in the Gulf of Panama and carries her husband, who is much smaller than herself, permanently attached to her forehead. The other angler fish, Linophrynidae, carries a luminous lure on its nose and also is the possessor of a luminous beard



Fish That Carries Her Dwarfed Mate Permanently on Her Nose; Above, the Angler Fish Equipped with a Luminous Lure and Beard

trailing under its lower jaw. The teeth of these fish are hinged at their bases.

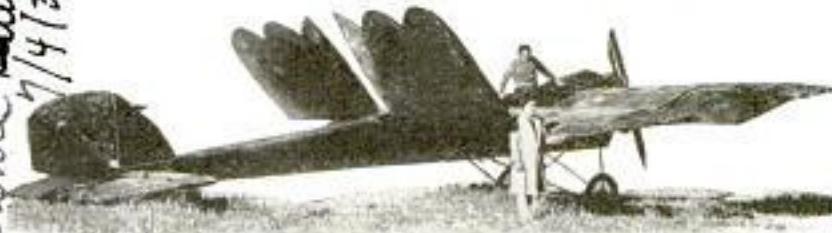
Science News Letter 74/2
MIRRORS REFLECT ARC'S RAYS
TO M.F.T. PLATINUM 9/14/40

Reflecting to a focus the rays from an electric arc instead of from the sun, a copper mirror has been made by two Swedish scientists which produces temperatures of more than 3,600 degrees Fahrenheit. An arc between poles of carbon, carrying up to 100 amperes of current, is fixed at one focus of an elliptical mirror seventeen inches in diameter, and the heat and light rays are concentrated at the other focus some distance away. A high temperature thus can be created at this second point. Rapid heating and freedom from admixture with foreign substances are advantages of the method, which will reduce a piece of platinum

requiring 3,250 degrees centigrade to melt, to a liquid condition in less than five minutes. About twenty-five per cent of the energy put into the arc is effective in producing the hot spot. Mirrors have been used for a long time to produce heat from the sun's rays but there is a natural limit to the heating power of such a device since a mirror can pick up only a certain amount of the sun's rays.

TURKEY PLANE LEAVES GROUND AT SIXTY-DEGREE ANGLE

Germany is experimenting with an airplane of unusual construction which is able to start and climb at a sixty-degree angle. The ship, known as the "turkey plane" because of its resemblance to that bird, also is equipped with a device which prevents it from falling in a nose dive.



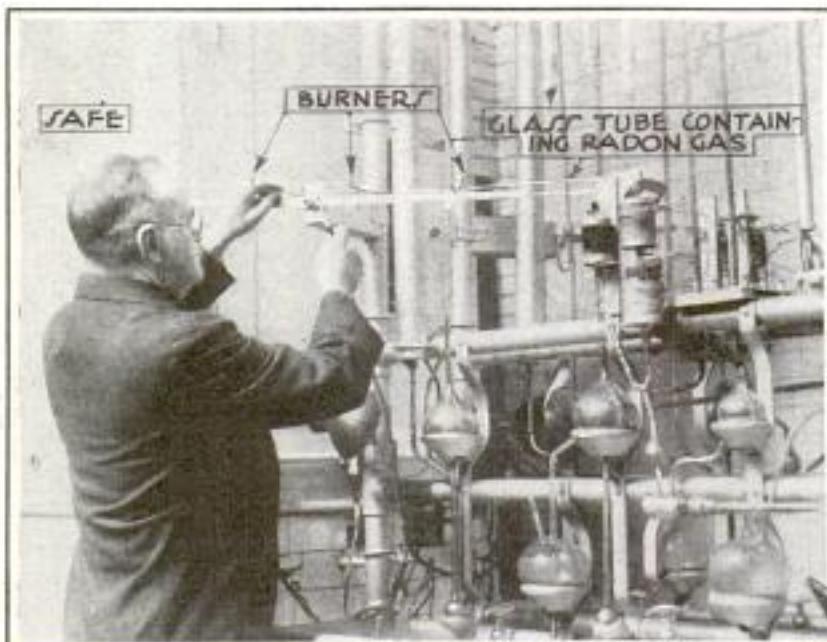
"Turkey Plane" Which Is Able to Climb at Sixty-Degree Angle and Is Equipped with Device to Prevent It Falling in Nose Dive

Stockholm Standard

Prof. C. A. Benedict
and Mr. J. Hayashi
metallurgical institute.

Designed by Herr
Joseph Pöppler
Berlin Germany

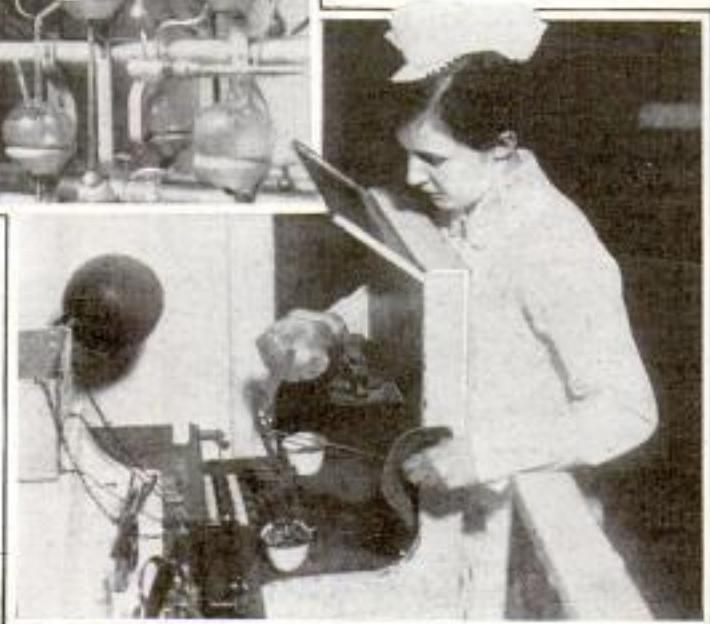
Precious Gas from Radium Will Save Lives



Plant, Above, Extracts Radium Gas; Nurse, at Right, Uses Shield in Handling Gas

It is more precious than emeralds, rubies or diamonds and it destroys disease and saves life. Yes, you have guessed right—it has to do with radium. Two Americans, Dr. G. Failla, of the Memorial Hospital of New York, and Dr. William Duane, of Harvard, have discovered a means to produce gas from radium, which has almost equal healing qualities.

There are only about 500 grams of radium in use throughout the world. A pound of the metal is worth \$2,852,222,400. The most familiar method of using radium employs the actual metal, in the form of



its strength for nearly four days. Small "gold seeds" of radon also are made, using fine gold tubing. These are implanted into diseased tissue and left there indefinitely.

FUTURE SPEED OF PLANES SET AT FOUR HUNDRED MILES

Commercial passenger and freight airplanes in the not very distant future may travel through the stratosphere safely at speeds of 400 miles an hour. This is the prediction of Prof. Auguste Piccard following his ascent in a balloon to the rare atmosphere. The experience, he declared, has proved that traveling at a high altitude is without danger if airplanes are equipped with compressors and air-tight cabins. He also announced that, as a re-

sult of his ascent, proof had been found that cosmic rays do not originate with celestial bodies. His measurements tended to show, instead, that these rays had their origin in gaseous clouds of slight density which may be best designated as cradles of new worlds in the making, the rays appearing to emanate from this nebulous matter.

The ancient Romans had indoor weather vanes, connected with a dial in the ceiling, to show in which direction the wind was blowing outdoors.

M. James b/a/31

Specie. Ilufay

**NEW COLOR MOVIES ARE TAKEN
WITH ORDINARY CAMERA**

Achievement of a three-color motion-picture film is claimed for a new process recently developed in England. The film base is printed with a foundation, or matrix, consisting of 500,000 minute red, green and blue violet squares to every square inch of film. Over this foundation there is coated a highly sensitive emulsion. The film which is inflammable may be exposed in an ordinary camera and shown by an ordinary projector without any special attachments.

**HAMMER WEDGE
FELLS TREE AS
YOU WISH**

Trees being felled along a fence or near other trees may be made to drop in the correct direction by means of a wedge jack now on the market. The jack is made in the form of a hammer with a screw handle. While the woodsman is sawing through the trunk, he drops the saw about two inches and cuts a cross section about three inches deep.

He inserts the wedge jack and as he chops out the "vee" on the side he wishes the tree to fall, he gives the wedge a turn or two at intervals until the tree tips in the right direction and will then drop into the place selected.

**PEACE-TIME STYLE OF TANKS
CARRY SMALL GUNS**

Fleets of peace-time tanks have been built in Germany under the limitations of the Versailles treaty. The tanks are simply automobiles built on a special chassis,



Peace-Time Tanks in the German Army Carry Small Guns; Note the Special Headgear Worn by the Crew to Prevent Injury in Maneuvers

armored and mounted with small-bore guns. Each car is manned by a crew of four, who wear a new type crash-helmet designed to lessen danger of injuries to their heads.

**EXTENSION LEG HOLDS LADDER
STRAIGHT ON STAIRS**

An extension leg for ladders that saves time and effort blocking up one leg for setting up on a stairway or the side of a hill, has been developed, combining these features with safety and speed of adjustment. The leg length of any ladder can be adjusted to suit any variation merely by hooking a piece of chain by its proper link. The extension has prongs at the upper end to fit around the leg and the chain with which to raise and lower it.



*Designed and sold by
Chas. E. Borchardt, plumbing
and F. Timball, Wash.*

*Thomas Co.
123 W. Main
Madison, Wis.*

a 1129 Cmt. Andrew D. Boone
613 Spreckel Theatre Bldg.
San Diego, Calif.

BLAZING a TRAIL



Above, Entrance to One of Temples of Mitla; Below, Senoritas of Tehuantepec Attired in Native Costume

"CQ...CQ...CQ," sang the tiny radio set. Its operator, huddled close in a large overcoat, frowned.

"IPH calling. CQ...CQ...CQ."

Five hundred miles south of Mexico City, atop a windswept mountain, the operator sat by his radio, calling. At last an amateur in Illinois heard the weak signals and answered. Then field station IPH told how three small American automobiles and their crews of six had pro-

gressed three miles during the day up steep mountainsides, en route from Nogales, 2,844 miles, to San Salvador, surveying a route for the 12,000-mile highway to connect all the nations of North and South America, from Fairbanks, Alaska, to Buenos Aires.

Across the dreaded Barrancas, the deep gorges of north Jalisco, the party had pushed its way south; down through the bad lands and treacherous canyons south of Mexico City and across high mountain ranges and through burning jungles to San Salvador, the explorers and road mappers crawled, until at last, in the late spring, they had driven their automobiles entirely through Mexico, the one country that presents the biggest problem in the continuity of the highway.

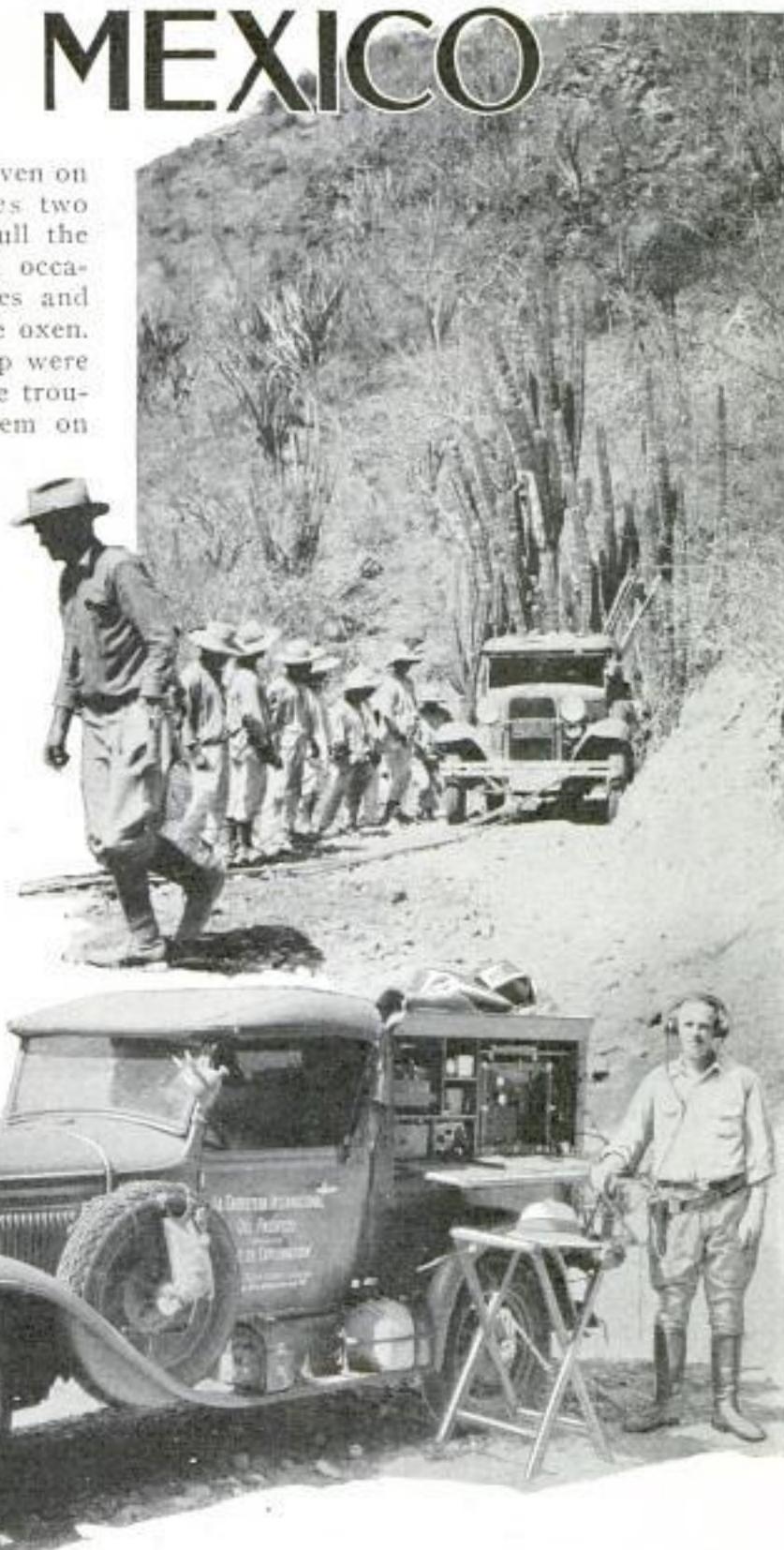
The survey party—a chief engineer, a doctor, radio operator, interpreter and two drivers—"attacked" Mexico twice before finally being the first to traverse the country from north to south in automobiles. Last year, they drove from Los Angeles along the west coast of Mexico

a 1129

through MEXICO

and on to Mexico City. Even on that journey, sometimes two yokes of oxen helped pull the cars up steep grades and occasionally blocks and tackles and racing engines assisted the oxen. The difficulties of that trip were hardly an indication of the troubles that would beset them on the journey recently completed, of the mechanical ingenuity to be developed in rounding narrow mountain burro trails with heavily loaded automobiles, of re-crossing one narrow river eighty-eight times in a seventeen and one-half mile drive.

Each car was fitted with a steel compartment to carry guns, ammunition, tools and supplies. The radio instruments were conveniently located on the sides of one truck and could go on the air without further preparation than to de-

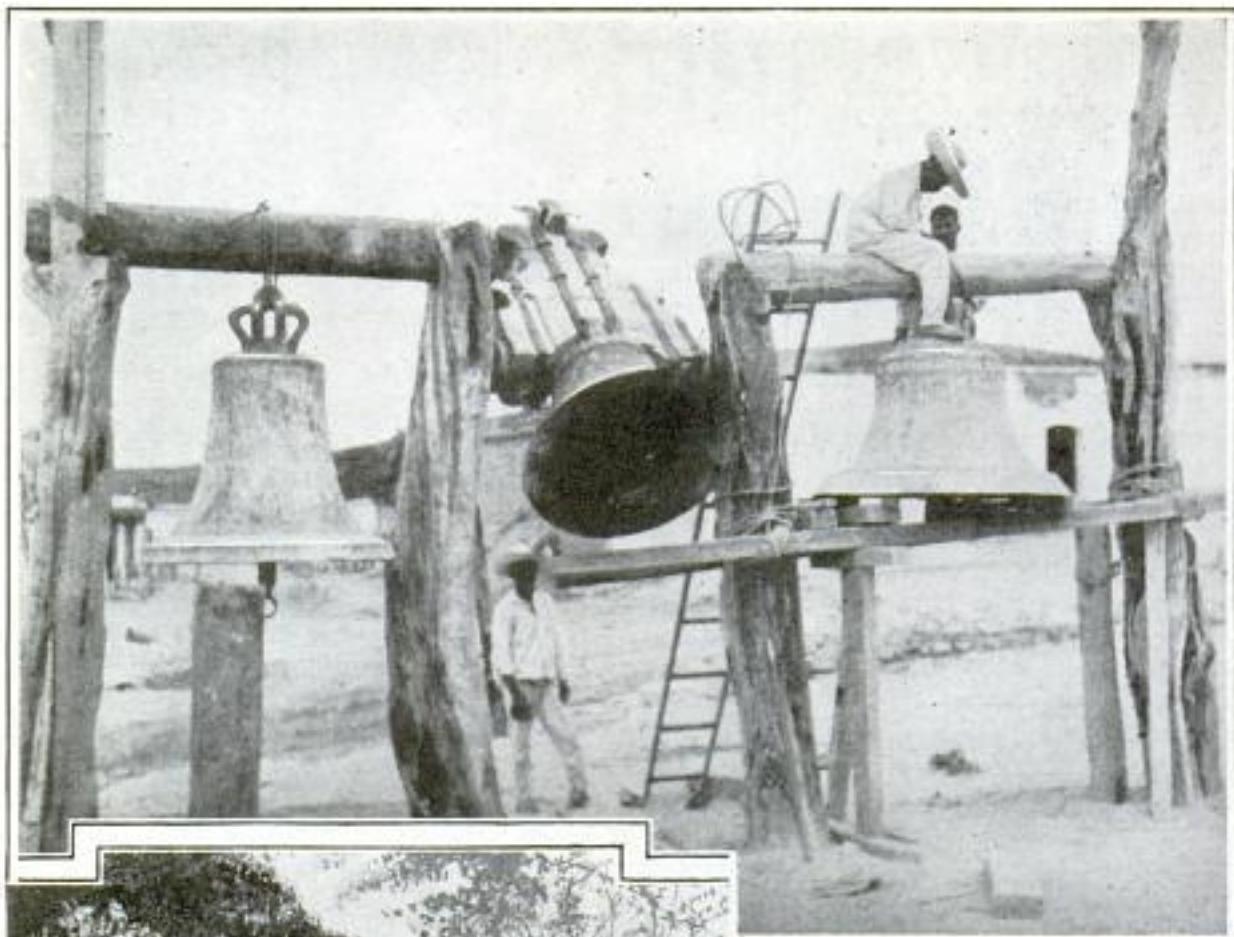


Above, Negotiating Burro Hill in the Mountains of Oaxaca with Aid of Block and Tackle and Many Men; Below, Radio Operator and His Portable Equipment in Same Mountains

posit a one-cylinder engine on the ground and start it. As the cars bounced down stream beds, over rough cobblestones that lined village streets, and around fallen trees, the radio set never broke loose

from its moorings, and over it the party was in daily touch with the United States through amateur stations scattered from Maine to California.

When E. E. East, chief engineer for



Above, Earthquakes Cause Church Bells to Be Hung on Racks;
Below, Bumps Made by Burro Pack Trains

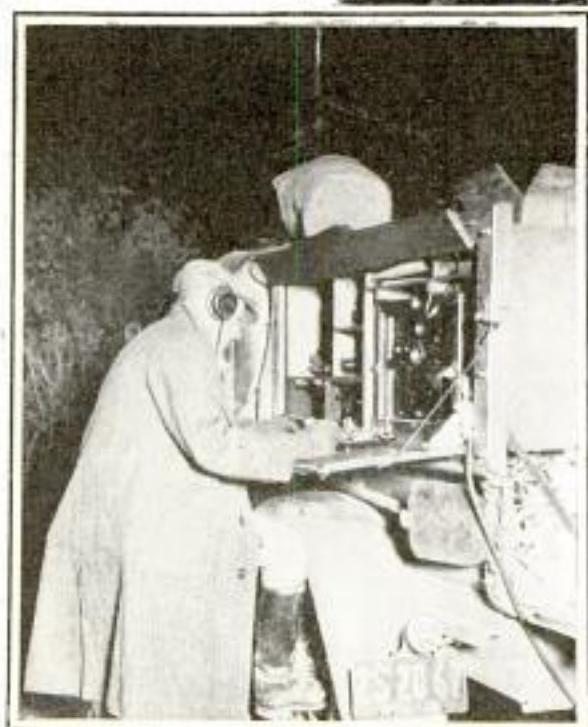
the Auto Club of southern California, turned the lead car south from Mexico City on the journey that was to bring many hardships in a primitive land, he led the caravan along an improved road to Puebla, eighty-two miles distant. At that point, having traversed the beautiful valley of Mexico and crossed the surrounding two-mile-high rim, the party left improved highways and embarked on the ancient Spanish trail, used only by ox teams, for Suchite, a populous community on Mexico's southernmost border. Even the primitive trail soon disappeared, however, and the three drivers turned their cars into a wild country where the natives never before had seen "devil wagons," as they called the little automobiles.

"Leaving Puebla," East explained, "was much like breaking down a fence and walking

from a clearing into a primitive forest. We knew that until we should reach Guatemala we could expect no help, that we would have to blaze nearly all our own trails and create our roadways as we went.

"Once the grade pointed up at such a sharp angle that the cars would not move until twenty men assisted the racing engines by pulling on a rope tied to the front axle. Going downgrade was no easier. Engine compression, four-wheel brakes and the score of Indians holding back on the rope were all that saved the cars from pitching to the bottom.

"We were warned about the difficulties that lay ahead, but we had no alternative, even though we might have wished to retrace our steps. We never could have

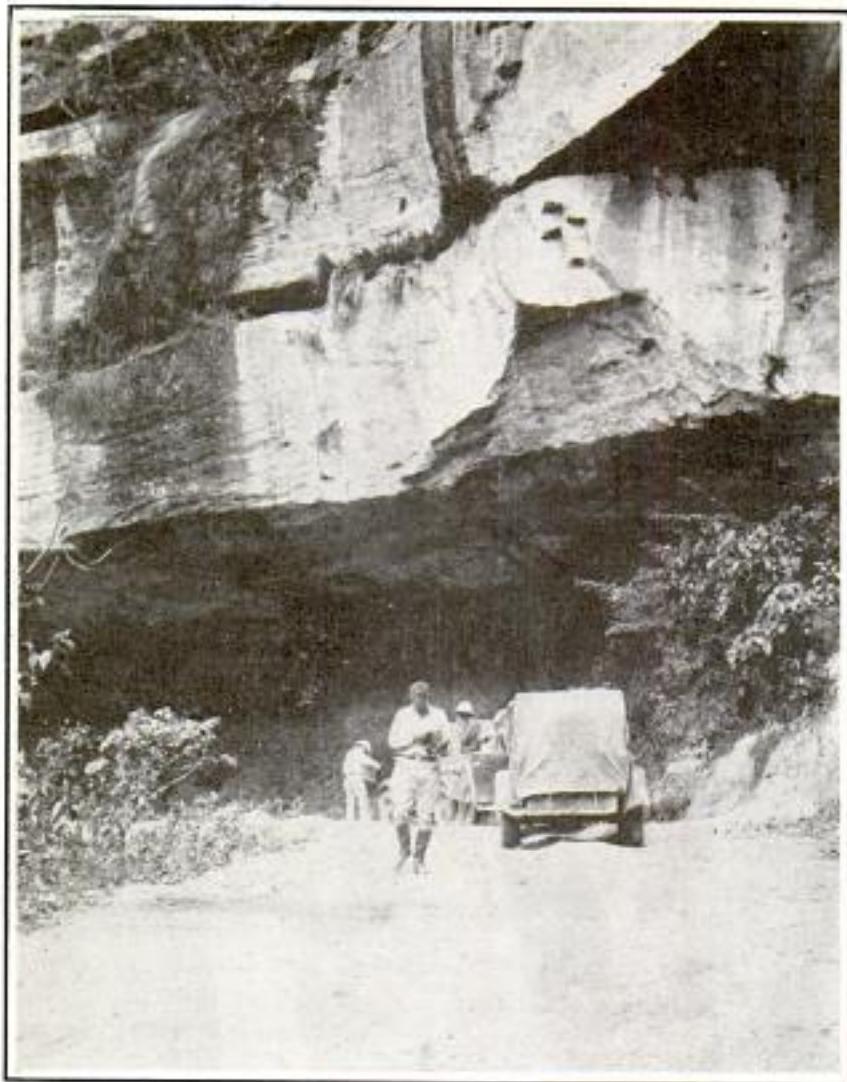


Top, Getting Out of Sand; Center, Mexican Toll Bridge; Below, Radio Operator at His Set

forsaken the Rio Te-hau-n-te-pec upstream. Just outside Nejapa, we climbed four mountain summits, widening a pack trail as we climbed, blasting boulders out of the path, building retaining walls and, at one sharp turn in the solid rock, constructing a bridge. Here we were, at an elevation of a mile, felling trees and lacing them together at a dizzy height over a canyon so our cars could crawl around the bend.

"At Rio Tequisitlan, after a fifty-mile road so rough all the equipment was packed on burros, we came upon the so-called 'cerreta' roads. The cerreta is a two-wheeled oxcart. Its tread is six inches narrower than an automobile tread, so we were constantly breaking trail through the decomposed sandstone for one side of the cars. These trails became trenches which were cut sometimes to a depth of ten feet, and as we threaded our way down them, the tires would ride on side slopes and wear away as though they were turning against emery paper."

Aerial surveys of routes have been completed in British Columbia and Alas-



Advantage Was Taken by Mexican Road Engineers of a Natural Shelf Running under a Ledge in Routing This Mountain Highway

ka for roads that will cost \$6,000,000. Governors of the several Mexican states met in Los Angeles several months ago to prepare plans for their sections. Even in South America the route down the Pacific coast is being mapped. Already tourist travel along one highway into Mexico has increased from two cars weekly to fourteen daily, due to the impetus of the trail blazers.

PURE METALLIC LEAD POWDER

Pure metallic lead powder is produced by a process recently patented by a Japanese inventor. The method depends on the fact that, while it is difficult to pulverize such a soft and malleable material as lead in its ordinary condition, it, like other metals, becomes brittle when in a semiliquid state. If a violent shock is ad-



ministered when the lead is about to solidify from the liquid state, or when it is about to liquefy, the metal can be broken to pieces. Hence the pure lead is first melted, and while in this state is thrown in the form of spray from an injector by compressed air and reduced to fine powder. While the powder is still semiliquid, it is impacted against high-speed propellers thus pulverizing it still further. This method has been found inexpensive and produces a purer form of powder.

LAPEL "MIKE" TO
BANISH RADIO
HOT PANIC

a1401 PANIC

Microphone fright, the panic that grips many persons, even public speakers, when they talk over the radio or a loud-speaker system, is dispelled to a considerable extent by a tiny lapel microphone to which

thirty feet of cord is attached. The instrument is attached to the clothing and the speaker is left free to gesticulate or move about, often becoming unconscious that his voice is being broadcast. This transmitter, not as large as a silver dollar, is attached by a cord to a plug and jack carried in the pocket, and from the jack a thirty-foot cord extends to a small cabinet hooked up with a loud-speaker installation or with a transmitting outfit. It is not adapted for broadcasting that includes instrumental music.



MICROPHONE



МАСКОНЫ

Conly 996 Coleophora luteolella H.

Civl. & rank

16

JP. Yoshi Tanaka & Companys Bell Telephone Laboratories
Fuzuki no. 4, Ichimie, Minato-ku 195 Broadway
Tokyo-shi, Uore, Nishi-ku New York
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Aerial View Reveals Beauty of the Capitol



920 Lexington Ave New York
Photo by Ewing Galloway, Modern Photography. Aided by a Clear Day, Produced This Striking Picture of the Nation's Capitol; Note How Each Detail Stands Out; It Is One of the Best Air Views of the Capitol

Beauties of the nation's capitol are revealed in startling detail from the air. In flying over Washington on a clear day recently, a photographer took an unusual picture of the capitol and its beautiful grounds. Latest photographic methods were used to bring out the contrast between the white buildings and dark trees, shrubbery and lawns.

LATH-MARKS MYSTERY SOLVED WITH KEROSENE LAMP

Lath marks on walls and ceilings really are due to changes in temperature of the exposed surfaces, and not to electrical phenomena, plaster porosity or dust filtration. This has definitely been established as the result of tests in which a section of wood and plaster wall was constructed, the upper surface covered with wall paper and a smudge produced by a smoking kerosene lamp. At first no lath marks appeared, then, when the laboratory window was opened, marks formed quickly. Electrical shielding had no ef-

fect on the appearance or disappearance of the marks. Finally a draft of heated air was used instead of cold. Immediately streaks of soot were deposited. Half the section was exposed to hot and half to cold air, and in the half exposed to hot, the streaks appeared over the lath and in the half exposed to cold, the smudges formed between them. It was thus shown that lath marks indicate heat leaks.



Apparatus That Showed the Causes of Lath Smudges to Be Due to Unequal Heating

*Cmt. Iser J. Paul, Jr.
1409. 537 S. Dearborn,
Chicago*

al 357
410

Mastering Navigation in Floating Classroom

Pupils at Right Are Studying Navigation Instruments in Floating Classroom; Below, Others on the Deck of the School Ship, at Another Class Preparing Them for Their Mariner's Degree



Wide World

practical tests by being taken to sea on a large yawl. The boat is equipped with sextants, charts, compasses and other necessary instruments to enable the students to prepare for their examinations as mariners.

914/4

GLACIERS MAY BE WEATHER KEY

Exploration of Greenland's glaciers may reveal two of nature's missing links, one, the source of the weather, and the other accurate information on the last ice age and a clue to the next one. These glaciers are repeating today the picture of events happening 30,000 years ago in what are now the most prosperous sections of the

Students of nautical astronomy and yacht navigating at the University of Southern California go to school in a floating classroom. In mastering the mysteries of navigation, the class is given

United States. Instead of being dead, frozen stretches, the ice areas are creative forces, in reality gigantic mills which chew and grind up the soil. In Greenland are found the same peculiar wind-erosion

Los Angeles, Calif.

Kansas City Star
Copyright material
6/20/31

markings in the stone that geologists have also found in the Mississippi valley. Greenland is one of the places where scientists hope to learn, by measurements over a period of years, whether the ice as a whole still is receding, an indication of warmer times ahead, or whether it is again preparing to make another spread of glaciation. They also desire to know the depth of the ice, estimated with some precision at 4,000 feet, although there are guesses of a maximum of 10,000 feet. This immense weight may be correlated to the sinking or rising of the land such as has left its marks in deposits elsewhere. Some meteorologists believe Greenland's chill winds may some day furnish the best key to accurate weather forecasting. Apparently these winds tend to blow outward in all directions from the ice cap, as if there were a spot where the ordinary swing of northern-hemisphere storm areas, always toward the east, did not apply. There is accumulating data to indicate that over the interior of the great cap there is comparatively little wind, a still area where the air is heavy and charged with cold.

TINY RACING CAR MAKES SPEED OF NINETY MILES AN HOUR

a1275
Not much larger than a toy model, a homemade racing car built by a California man attains a speed of ninety miles an hour, although its cylinder displacement is only seventy-five cubic centimeters. It is so light that one man can easily lift one end, but because the center of gravity is low, the Lilliputian racer takes curves at almost open throttle. The wheels formerly were on the tail of a tri-motored airplane.



Tiny Homemade Racing Car That Makes Ninety Miles an Hour; It Has Front-Wheel Drive



Wide W.
Window Cleaners "Take the Trolley around Huge Building to Wash 30,000 Panes of Glass

CARS FOR WINDOW WASHERS HELP CLEAN GLASS

a1335
Miniature trolley cars carrying tanks of hot and cold water and suspended from a rail which encircles the entire building are used by window washers who keep the 30,000 panes in the General Electric tank shop at Pittsfield, Mass., clean. The cars may be lowered or raised by chain falls. They are moved with a geared wheel and ratchet.

The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the bureau.

all 4³ comt. L. Corley McDarmen
Langley Field
Hampton, Va

A Wild Night



By CORLEY McDARMENT
Langley Field, Hampton

AT ELEVEN o'clock on a recent night, the army blimp "T-C-Ten" under command of Lieut. William J. McCracken, nosed into a dense fog over the James river and began one of the most thrilling flights in history.

Eight men, including a stowaway, were in the airship. Sergeant Miller, a veteran of lighter-than-air service was navigating, laying a course into the dot-dash-two-dots of the Langley field radio beacon. The fog thickened, and finally the night was one black, stifling cavern into which the two propellers bored with a muffled roar.

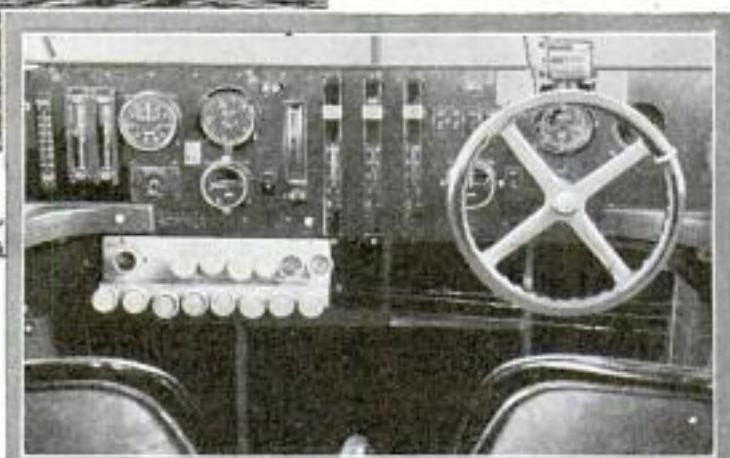
They were over the edge of the field, about 200 feet above the hangars, but a blanket of fog hid the face of the earth.

"Can't see a thing below."

"Let's turn around and make a new approach!"

The blimp was slowly swung around and the nose lifted for a little more altitude. In a few minutes, small blurred patches of light shone through the fog, but shortly the mist again swallowed everything. The airship plowed on blindly.

Crash! R-rip! The



Photos Courtesy The Daily Press, Newport News, Va.

Forced Landing of an Army Semi-Rigid Aircraft; Below, the Pilot's and Navigator's Seats of the "T-C-Ten"

big bag swayed drunkenly. "Stop the motors!"

But it was too late. What the obstruction was that the blimp nosed into may never be known, but it caved in a part of the gondola, threw a motor out of posi-

all 73

in the T-C Ten



tion and, before it could be stopped, the propeller had eaten a hole through the outer fabric and punctured a forward gas cell. Ballast was quickly tossed out and the ship arose. Gas escaped from the forward cell, and the nose dropped to a perilous angle. Men clung to the rails of the gondola and fingered the hard iron rings of their parachutes. More ballast was thrown out, and the ship floated upward above the blanket of fog which was about a thousand feet thick.

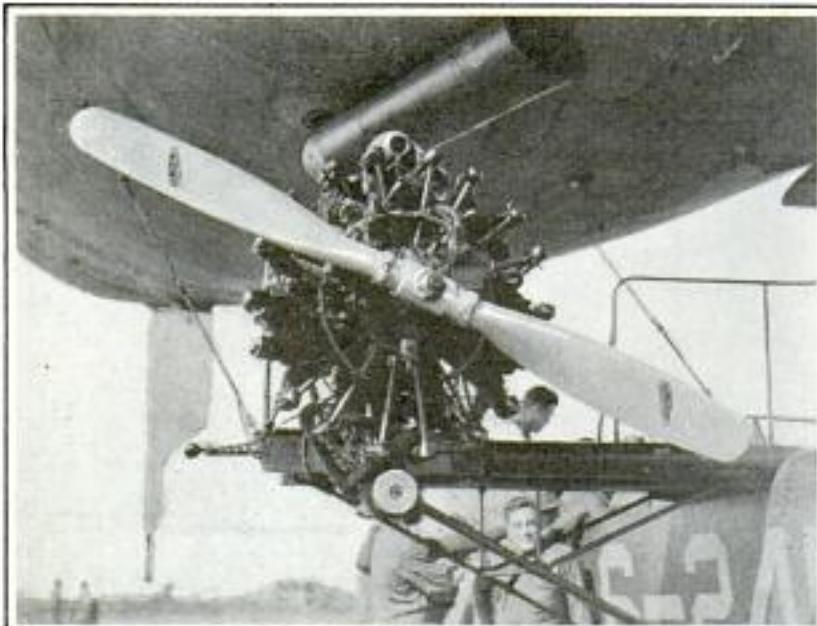
In the meantime, a frantic crew—a landing party of men and officers—were burning barrels of gasoline in the middle of the field hoping the light would act as a beacon. Three times the watchers heard the dull roar of a motor in the heavy mist. But after the airship had circled the field the third time, it mysteriously headed northward and presently its motor died away. It was not until the morning that the fate of the blimp was known, and the pilot told his exciting story.

The "C-52," Better Known as the "T-C-Ten," in Flight; Lieut. William J. McCracken, Commander on the Wild Flight

When the ship arose above the fog, the question of jumping came up. Riding at the dangerous angle put a tremendous strain on the gondola, and the memory of what happened to the "Shenandoah" a few years before was still vivid in the aeronauts' minds.

While the crew was debating whether or not to go on farther up and leap, someone shouted: "Look! A light on the clouds!"

A 11/93



They looked down and saw a red glowing spot.

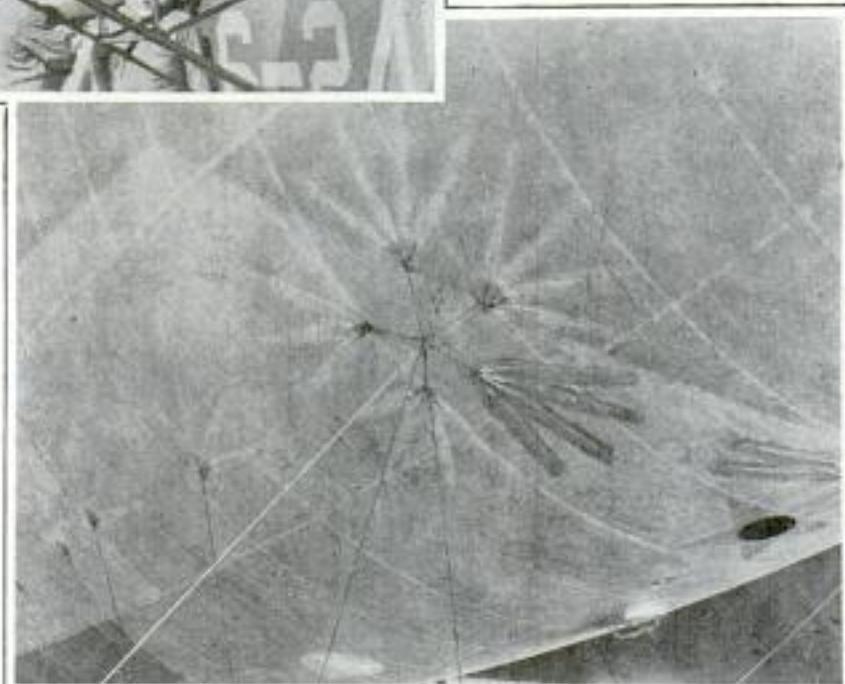
"Signal from the ground party! Let's try to make it."

The blimp was now being navigated with a mixture of free ballooning and part motor—a ticklish job when visibility is good and a most hazardous one in the dark. But with great skill the pilot and navigator managed to swing the ship around so as to come down near the red glow in the fog. But as soon as the airship descended, everything went black as a Stygian cave. Three times they rose above the fog, lined up on the red glow and tried to make it without success. The loss of gas and ballast by now was becoming serious.

The pilot and navigator knew that a large body of water lay northward of the field. There were Back river, Mobjack bay and the York river all running together. It was decided that a chance on the water would be better than the land. Life preservers were made handy, and the non-sinkable kapok coats were donned over parachute harness. It was then that the stowaway was found. But nothing

could be done about it.

Loss of valuable helium gas was not the problem now. It was the life of the crew. The pilot and navigator began free ballooning. They laid a course in a favoring wind which carried them northward. They flashed the light every few seconds upon the little statoscope in its leather case, and when the bubble broke



Top, Engine Mounting Which, on the "T-C-Ten," Tore Loose and Ripped the Bag; Below, How Cables Are Attached to the Envelope

too rapidly to the right or "Ascend" side, a little gas was valved out, and if the bubble broke to the left, ballast was thrown over the side. The sand ballast was dropped by trickling it slowly through the fingers and watching the effect. The crippled ship had to be brought down gently or all would be lost. Water scarcely has any "give" at all, as every one knows who ever sprawled from a diving board.

After what seemed like a very long time, the tilted car began to drag water. The only thing to do now was try to hang on until morning. The water tended to hold the flat bottom of the car to the surface and this also took up some of the



The "T-C-Ten" at Rest in the Trees at the Water's Edge, after Its Perilous Cruise All Night over a Fog-Bound Hangar, Brought Down by Ballooning Skill

weight from the remaining gas cells. The airship became like a floating nautilus and unless the wind arose, it seemed the crew might ride it out until morning.

But after floating about two hours in the blackest of nights, the sound of waves breaking upon shore or reef came from the darkness. This was cause for new alarm. If it were a rocky place or a reef, the car would be pounded to pieces. The crew were all set for the worst while the sound of breaking waves grew louder. A short time later, however, there was a scraping sound on the bottom of the car.

"There is a big cliff or a row of trees, one or the other, right ahead," somebody shouted.

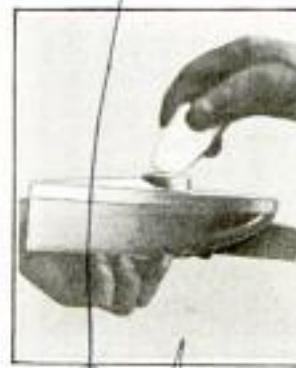
The lopsided blimp strained forward. Wind could be heard rustling through tree branches close at hand. Instead of a cliff, the dark band which loomed ahead was a forest. Somebody reached overboard with the hook and found bottom in shallow water. Again the order to remain aboard was given, while a member of the crew ripped a valve on the rear gas cell and allowed the great folds of rubberized envelope to drag into the water.

Guy ropes were then taken by members of the crew who waded to the shore and fastened them to trees. Through luck, courage and skillful air work, nobody was killed or seriously injured.

41382

MODEL BOAT POWERED BY ICE PROPELLED LIKE ROCKET

Power derived from the carbon dioxide released by "dry ice" is used by a Los Angeles man to propel a small boat. The craft, about eight inches long, is made of molded tin with a screw top above the deck. Inside the boat is a small chamber in which pieces of dry ice are placed, the compartment then being filled about one-third with water and the metal cap screwed on. This causes carbon-dioxide gas to be released violently, and expelled through a tube running along the keel.



*John M. Cage
2708 Mozart Street
Los Angeles, Calif.*

Malcolm P. Rose,

416 Winter Haven,
FROM AQUAPLANE TO A GLIDER
IS THRILLING TRANSFER



"Stunt Man" Thrills Spectators with a Transfer from an Aquaplane to a Glider; the Plane Was Towed by a Speed Boat and the Glider by an Outboard Craft

Using a glider instead of an airplane and an aquaplane instead of an automobile, a "stunt man" at Winter Haven, Fla., recently thrilled onlookers with an unusual transfer. The aquaplane was towed by a speed boat and the glider by an outboard motorboat. The stunt man rode the aquaplane, and when the glider came over his head, reached up and seized a trapeze—and swung off into space.

WILD GAS WELL CONTROLLED BY RELIEF HOLES

By drilling relief holes near it, a wild gas well was tamed recently in Louisiana. The well was brought in at a depth of 2,475 feet with a rock pressure of 1,125 pounds to the square inch and a flow of 67,000,000 cubic feet a day. It broke the casing and formed a crater, 200 feet in diameter and from twenty to forty feet deep. To stop the flow of gas into the crater, which was becoming a menace to the gas field, another well was drilled as close to the crater as was deemed safe. When it was completed with a capacity of 64,000,000 cubic feet, the full flow was turned into a pipe line, thus decreasing

Samuel L. Gordon
Curator of Mineral

the crater pressure. A second relief well was drilled on the opposite side of the crater, and later a third was bored. The pull from these wells permitted the filling of the crater-well casing with concrete.

LIQUID A MILLION YEARS OLD IS FOUND IN CRYSTAL

Liquid, at least one million years old, is contained in a sealed cavity in the center of a beautiful crystal of a mineral known as calcite, recently acquired by the Academy of Natural Sciences at Philadelphia. The cavity contains one-half gill of what is believed to be water with some minerals in solution. The cry-

tal came from lead mines near Rossie, N.Y. Bubbles and small drops of liquid have been found in crystals previously but not in such a large quantity.

TINY DYNAMIC RADIO SPEAKER USED IN MANTEL SET

Increasing popularity of Lilliputian radio sets has resulted in the production of a tiny dynamic speaker that is incorporated in a four-tube receiver no larger than a mantel clock. This speaker is only six and one-quarter inches in outside diameter and three inches in depth.



Small Dynamic Radio Speaker. Intended for a Receiver No Larger Than a Mantel Clock

natural gas field
natural gas field cap. Utah Radio Products Co.
#1504, 360 Michigan
are "Chicago"

Science Service
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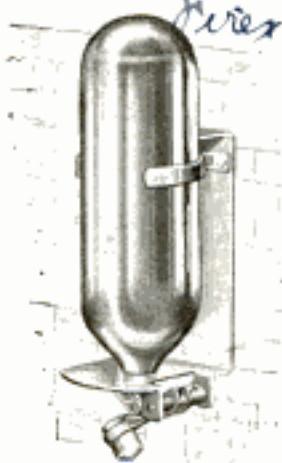
POPULAR MECHANICS

417

STRANGE ANIMALS TO BE SOUGHT BY EXPEDITION

Sailing for the Island of Trinidad, naturalists for the Philadelphia Academy of Natural Science, will make a special study of that strangest of all tropical fowls, the "oil bird." The young of this species are so fat that they are a regular source of food oil for the natives. The Indians each year hold an oil harvest and melt down the butter from the young birds. The product is half-liquid, transparent, has no odor and is so pure that it can be kept for more than a year without becoming rancid. The "butter bird," when grown, has a double tooth in its beak, and its small blue eyes cannot stand the sunlight. It quits its cavern only at night and hunts principally in the moonlight. In the same caves, the naturalists also will seek the curious white bat.

AUTOMATIC FIRE QUENCHER ALSO CALLS FOR HELP



Standing on guard day and night, an automatic fire extinguisher not only operates to put out a fire anywhere near it, but at the same time sounds an alarm likely to bring human aid if needed. It consists of a sealed glass container attached by a frame to a wall

and filled with a liquid gas that will smother flame. In case of a fire, the heat breaks a fusible link, releasing a hammer which smashes the glass container and at the same time sets off a blank cartridge inside the hammer to summon help. The liquid gas is drawn to the flames by the natural circulation of heat and smothers the blaze by shutting off the oxygen.

Colorado has fourteen national forests with a total area of 13,309,549 acres.

*Fires Corp Railway
Exchage Bldg St Louis*

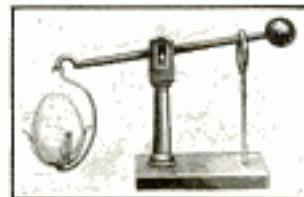


Teaching Parrots to Talk with the Aid of a Phonograph Which Repeats Words While the Class Listens

PHONOGRAPH TEACHES PARROTS TO TALK AND WHISTLE

Teaching parrots to talk in a Los Angeles zoo has been simplified by using a phonograph to recite the lessons. A trainer daily takes four or five birds to a quiet and secluded cage, where they are seated on a perch facing a phonograph to which a loud speaker is attached. Records for beginners carry such familiar phrases as "Pretty Poll" and "Hello, Polly." After an hour of this each day for a week, the most backward pupil usually becomes interested and begins to imitate the sound.

BALANCE TESTS EGGS' WEIGHT FOR COOK OR FARMER

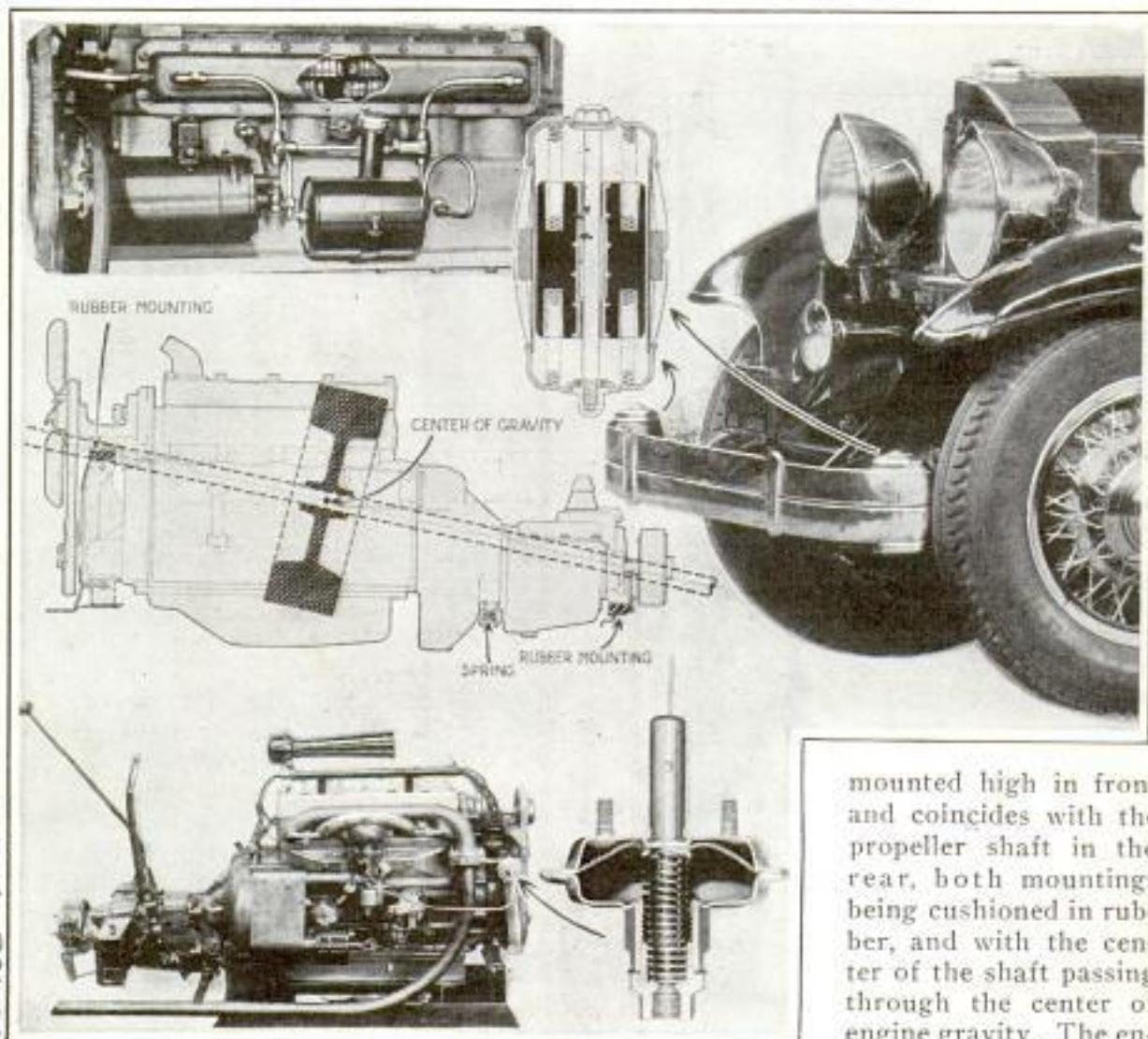


The weight of eggs is determined by using a new testing balance designed to help the housewife in her cooking and the farmer in selecting eggs for the market, or for breeding purposes. Eggs of a standard weight contain more nourishment than small eggs, helping the cook to determine how many should be used in recipes. A dozen eggs should weigh not less than twenty-two ounces to command the best price, and the testing balance aids in classification for the market.

*Henry Trempier
Copyright material
Publ*

a 1419

Latest Improvements in the World of Autos



Oil Heat Control, Top, Left; Mounting of "Vibrationless Four," Center, and Pressure Spark Control, Below; Front Vibration Damper Above at Right

Four developments that have resulted in much interest among automobile owners and prospective purchasers have been introduced in recent weeks. One of these is a front vibration damper designed to prevent wobble of radiators, lamps and fenders on rough roads. Two lead weights are placed, one in each end of the bumper. They are supported top and bottom by coil springs and housed so neatly the entire assembly looks like a bumper decoration. A leading manufacturer of four-cylinder cars recently announced a model that operates so smoothly it "feels" like an eight. The engine is placed in the frame just as if it were a huge flywheel on a shaft. The hypothetical shaft is

mounted high in front and coincides with the propeller shaft in the rear, both mountings being cushioned in rubber, and with the center of the shaft passing through the center of engine gravity. The engine is prevented from swinging too far on its mountings by a spring

running from the flywheel housing to a frame member. The same car has its spark ~~advance~~ controlled automatically as the result of changes in pressure in the fuel system. A pipe runs from above the throttle to a diaphragm on the ignition unit. When the throttle is closed and suction increases, the diaphragm retards the spark, but as soon as the throttle is opened and the vacuum decreases, the spark is advanced. An oil-temperature regulator is a feature of a new six-cylinder model. Within an enlarged water-jacket plate are placed two corrugated tubes, through which oil is pumped, cooling it in summer and warming it in winter, thus reducing wear all year round.

Plymouth car - Chrysler Corp. Electric truck

nash motors Co
Kenosha Wisc
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Designed by Hammond 1418 U. S. No. John J.
Tinkeen Island Hancher, Worcester

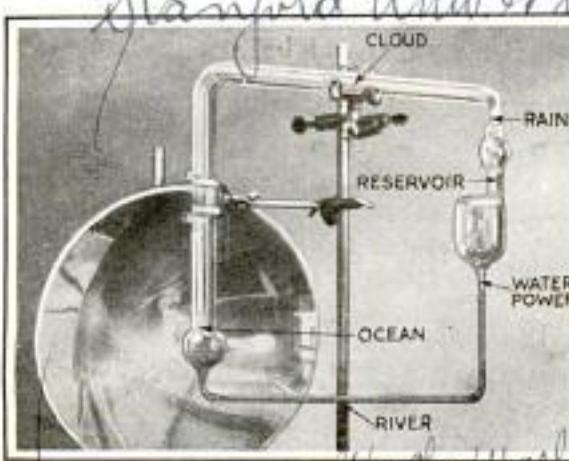
Rapids POPULAR MECHANICS Mass 419

ELECTRIC EYE SORTS OUT BEANS DISCARDING BAD ONES

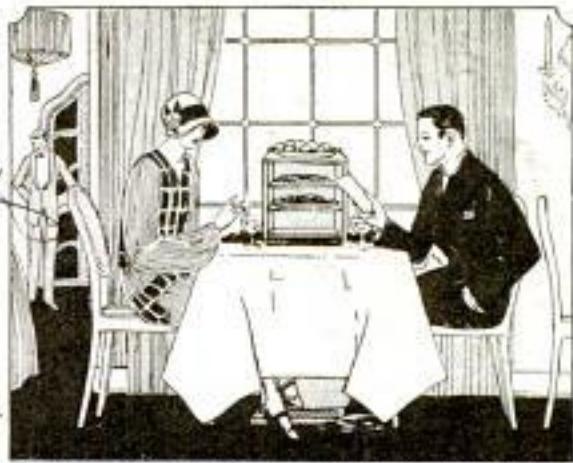
Navy beans are being sorted by an electric eye which discards all those not meeting the required standard of whiteness. The machine inspects the beans one by one and a photo-electric cell, sensitive to changes in light, closes a relay when a discolored bean passes, causing a metal finger to deflect the bad one. The beans are picked up by suction and carried around on the edge of a drum. On their way to the electrical eye they pass a patter which puts them in position so each can be viewed. As a dark bean appears, the normal current passed by the photo-electric cell diminishes, this drop acting to energize an apparatus which operates the finger.

"WEATHER" IS MADE TO ORDER IN GLASS-TUBE "WORLD"

Weather is made to order in a series of tubes assembled at the California Institute of Technology to represent the processes by which nature forms rain. At one side is a lamp and reflector in the role of the sun. The heat warms a blue liquid in a glass tube representing the ocean, and the fluid rises in the tube, or air, then condenses into "clouds" in a horizontal section at the top. Passing through the horizontal tube, the clouds cool and condense moisture, or rain, which drops into a reservoir and from there into a tiny glass bowl, then into another tube representing a river and returns to the ocean.



Assembly of Tubes Used with a Light to Demonstrate Process by Which Nature Makes Rain



Automatic Elevator Rises from Kitchen to Table with Food Ordered by Dropping Card into Slot

ELEVATOR SERVES DINER FOOD FROM KITCHEN BELOW

Guests in a "magic restaurant" select their table, mark on a card the food they want, drop the card into a slot, and the food is served quickly on four silver trays or shelves which rise on an elevator from the kitchen to above the table level. The device has been patented to eliminate tray carrying and tipping, and to increase seating capacity by doing away with lunch counters. The menu has a metal edge which forms an electrical contact with a bell when dropped into the slot.

SEA LIGHTED DEEPER IN TROPIC THAN POLAR LATITUDES

That latitude has a far-reaching effect on the distance light will penetrate sea water has been proved by scientists in recent investigations, still uncompleted. It was found at thirty-three degrees north latitude, light of a certain intensity penetrated to 800 meters, while at fifty degrees it went to 500 meters' depth, and at sixty-seven degrees the same intensity was recorded at a depth of only about 200 meters.

Mr. Austin H. Clark
curator, Smithsonian Institution

Acme News Pictures
320842 na
newsp

April 1



Top, Taking a Turn "in High," and, Below, Gar Wood at the Wheel of His Newest Demon of the Water

NIP-AND-TUCK rivalry for the world's motorboat speed record between Gar Wood's "Miss America IX" and Lord Wakefield's "Miss England II," has fascinated the entire world. Both boats have now topped the 100-mile-an-hour mark

Burning

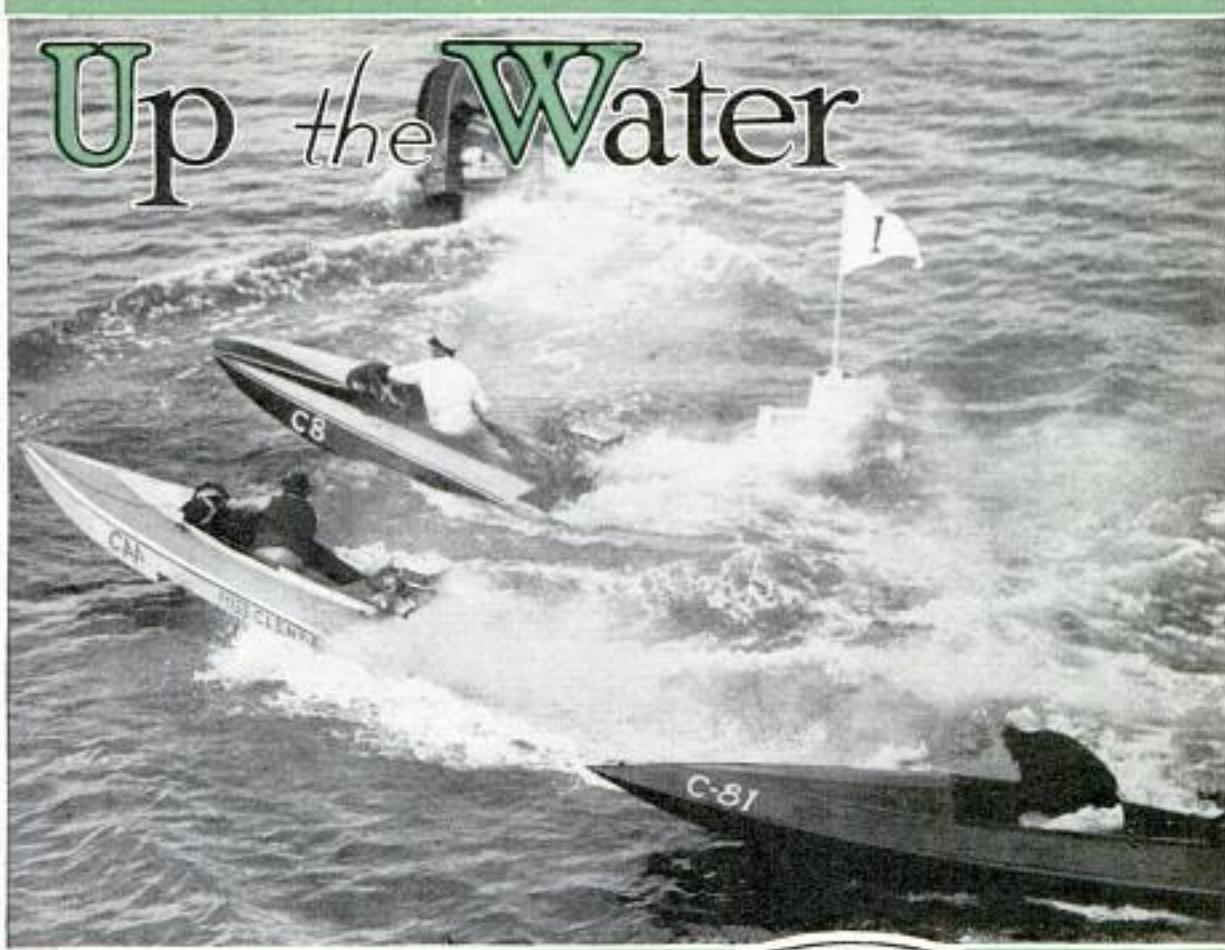
and each has broken the record set by the other in isolated time trials.

On Labor Day weekend, these two famous speed monsters will meet on the race course on the Detroit river to compete for the British International (Harmsworth) trophy, carrying with it championship in unlimited power, and held by Gar Wood since 1920.

Gar Wood's "Miss America IX" is the development of almost twenty years of experience in the building of fast racing craft.

"Miss America IX" is a single-step hydroplane, with the step in a straight line athwartships. Her lines, however, are drawn to give the craft the utmost in speed for the power she carries. Wood also says the hull will respond to a lot more power than she now has.

Up the Water



The step hydroplane rides on a "cushion of air" while in speed. The boat gets up on top of the water and runs on a wetted surface of small expanse.

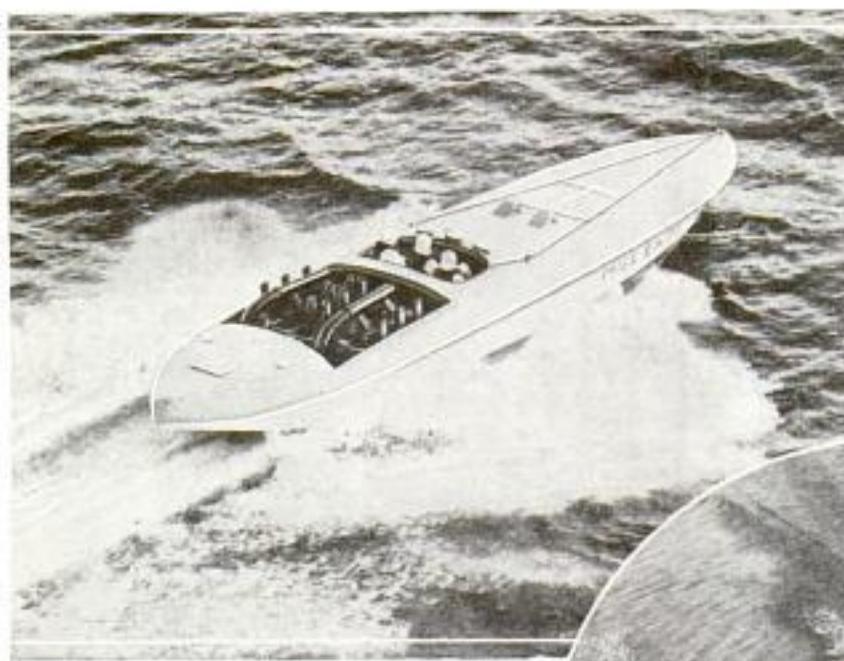
"Miss America IX" is twenty-eight feet long with a beam of eight feet, seven inches. The driver and mechanician sit in the extreme stern behind the engines, and the complete outfit, without fuel or crew, weighs close to 8,000 pounds.

"Miss England II" is the result of two years' experimentation by a group of British sportsmen under the leadership of the late Maj. Sir Henry O. D. Segrave. This brilliant and fearless man succeeded in developing "Miss England I" into the fastest single-engined boat in the world, driving her to the 92.8-mile mark with only one Napier Lion twelve-cylinder engine rated at 960 horsepower.



An Exciting Turn around a Buoy, Above, and, Below, Gar Wood and His Mechanic, Orlin Johnson, in "Miss America IX"

"Miss England II" is thirty-eight and one-half feet long with a beam of ten and one-half feet. She is thus ten feet longer and almost two feet wider than "Miss



A2224

"Miss America IX" is a twin-screw craft with her propellers turning outward in opposite directions, thus balancing the boat.

The smallness of the single propeller on "Miss England II" is required to allow it to turn up at the terrific speed of 12,000 revolutions per minute



"Miss England II" Snapped from the Air at 103.75 Miles an Hour; Below, Boat Ride on the Grass

America IX." The British racer, too, is a single-step hydroplane, only her step comes to a point in a shallow V-design instead of being transverse, as with the Gar Wood boat. She weighs only 1,000 pounds more than "Miss America IX." The great beam of "Miss England II" is to offset the twist of the propeller, as she is a single-screw boat. The driver and mechanicians—there are two required for her—all sit forward of the engines, an arrangement which is regarded in this country as especially hazardous in case of accident at high speed.

The engines in "Miss America IX" are Packard aviation motors, each delivering 1,060 horsepower.

The engines in "Miss England II" are secret motors developed by Rolls-Royce under supervision of the British air ministry for war purposes, and set an official boat record July 9, at Lake Garda, Italy, of 110.25 miles per hour.

The power application of the two boats is radically different. That from the twin motors in "Miss America IX" is transmitted forward to two separate gear boxes, one to each shaft.

In "Miss England II" the twin motors deliver their power to a single gear box which transmits the total power to a single propeller shaft.

and also to keep down the "twist" incident to all single-screw boats.

The steering mechanism on "Miss America IX" is most simple. It consists of a single bow rudder about the size of a post card—four by six inches.

"Miss England II" is steered by a special secret mechanism about which the late Sir Henry was most enthusiastic. There are two rudders, one forward and one aft, and in speed she appears to wobble somewhat.

Both boats have to slow down at the turns, but it is certain that Wood with his twin screws will swing them all at much faster speed than will Kaye Don, who will drive "Miss England II" in the attempt of her owner, Lord Wakefield, to lift the Harmsworth trophy.

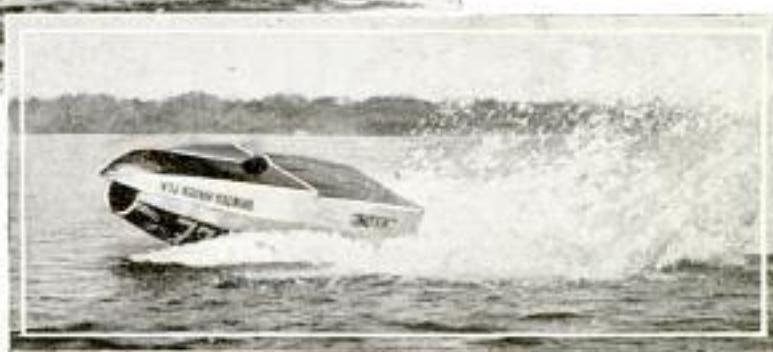


The Merry-Go-Round, Consisting of a Boat Hooked by Cable to a Swivel on a Post, Like So Many Test Devices, Has Become a Popular Sporting Medium; the Apparatus Was Originally Designed to Test a Boat in a Limited Area of Water, but Sporting Enthusiasts Have Changed Its Purpose and Added Hurdles Such as Above



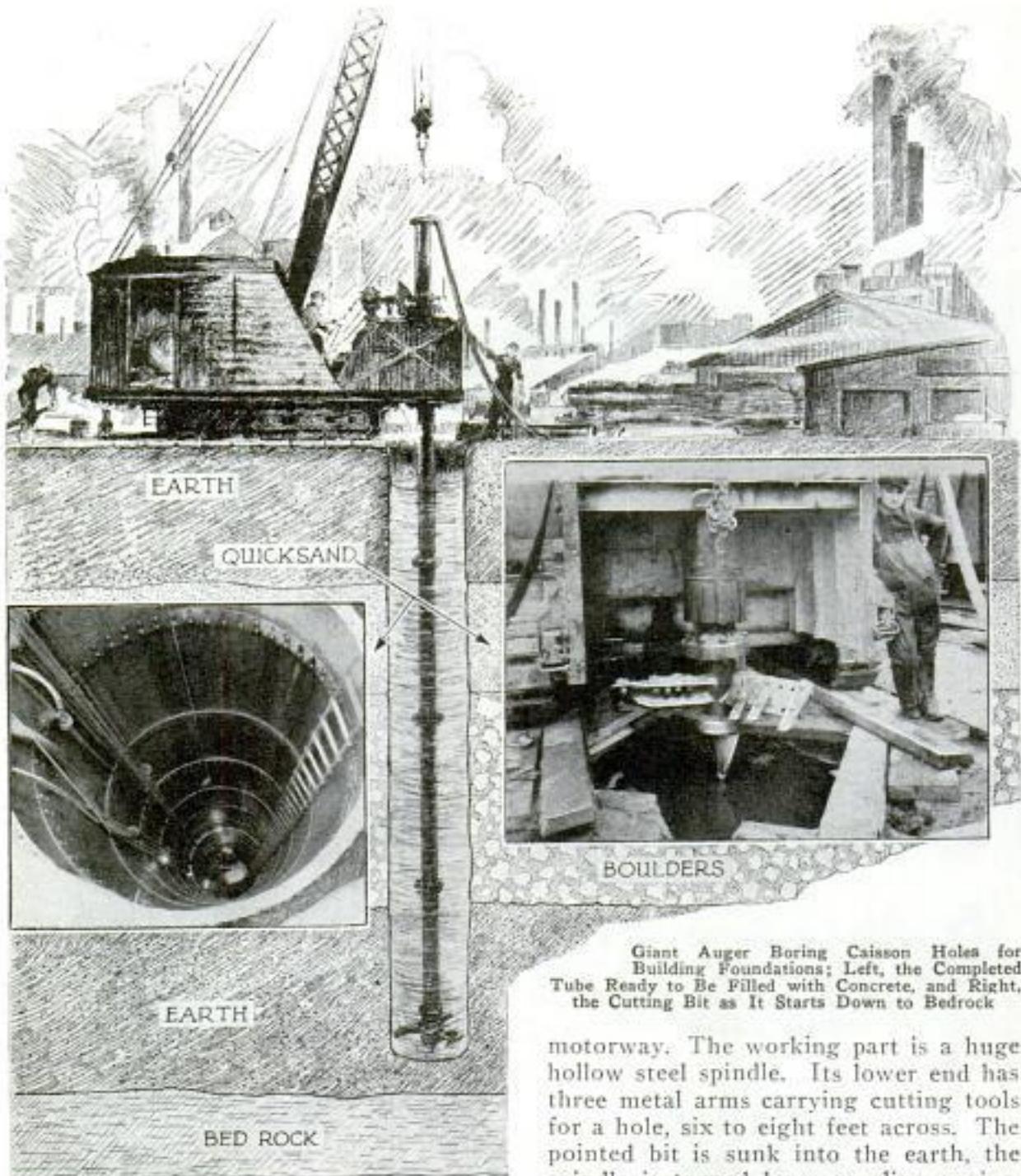
Al Thompson, Above, at the Tiller of the "Black Maria III" as She Bucks the Waves at High Speed during One of the Preliminary Races in Preparation for the National Midwinter Outboard Championship Held under the Auspices of the American Powerboat Association on Lake Elsinore, Los Angeles

Getting Ready for a Real Thrill in the Rolling Boat, Above; the Craft Originally Was Designed to Test the Inherent Stability of a Boat and the Maximum Steering Capacity of the Outboard Engine, and Was Built to Roll Completely Over in the Event of Tipping; at the Right, Is Seen the Boat in Action, Rolling Completely Over



a 1069 J.W. C. L. Powell, Pres
424 Caisson Contracting Co.
POPULAR MECHANICS
57 & 42nd St New York

Giant Auger Bores Caisson Holes in Earth



Giant Auger Boring Caisson Holes for Building Foundations; Left, the Completed Tube Ready to Be Filled with Concrete, and Right, the Cutting Bit as It Starts Down to Bedrock

A giant auger that bores holes for foundation caissons to bedrock has given sidewalk crowds something new to watch. Instead of forcing down a cylinder or a heavy box in which the diggers work in compressed air, to keep water from entering, an augerlike rotary drilling machine was employed to set the supporting piers for part of a New York elevated

motorway. The working part is a huge hollow steel spindle. Its lower end has three metal arms carrying cutting tools for a hole, six to eight feet across. The pointed bit is sunk into the earth, the spindle is turned by a gasoline engine, and water is forced down the tube to moisten the soil. The device leaves the muddy material where it is, to prevent collapse of the walls. The method of excavation can be employed even near the foundations of large buildings without endangering them. As the spindle descends, sections are joined to it to make it fifty, sixty or even ninety feet long. When bedrock is reached, the path of the

Clarence De Luca?
Research Ass't.

11334

Bureau of POPULAR MECHANICS

425

drill is surrounded by steel casing, capped with steel beams temporarily and pounded down with a pile driver. The mixture is pumped or scooped out with orange-peel dredging buckets.

GOLDFISH VALUED AT MILLION
RAISED EACH YEAR *a 145*

Rearing goldfish for the United States market has developed into a \$1,000,000 industry. The trout and pond-fish industries increase the total value of fish farm products to above \$2,000,000 a year, according to department of commerce figures. Natural lakes in Colorado are used in trout raising, about half the water acreage of the industry being located in that state. Increasing demands for all kinds of fish have spurred efforts of fish farmers throughout the country.

9136 7
SAFETY KNIFE FOR PARACHUTE
AIDS JUMPER IN ACCIDENT

As an aftermath of a recent mishap in which a parachute became entangled in the struts of an airplane as a jumper leaped from it, a safety knife and sheath has been designed for use of the occupant of the chute in a similar emergency. The knife fits in a pocket attached to the harness, enabling the jumper to cut himself free and rely on his emergency parachute.



Parachute Harness Equipped with Safety Knife to Enable Jumper to Free Himself in Emergency



Inflated Arm Bands Which Keep Head above Water While Beginner Is Learning to Swim *Wade Wala*

SLEEVE-BAND LIFE PRESERVERS
AID NOVICE SWIMMERS

Learning how to swim is simplified for beginners by inflated arm bands which fit on each upper arm and keep the head above water while the novice is perfecting his strokes. These side-wing life preservers are not bulky and do not interfere with arm motions in the water.

OLD ALPHABET LIKE DRAWINGS
OF SPEAKING LIPS *a 147*

Forms of the letters in a recently discovered old Phoenician alphabet show evidences of having been chosen to represent the forms of the mouth used in speaking them. This theory is advanced by Sir Richard Paget, an authority on human speech, who finds that nearly every one of the twenty-nine symbols used is suggestive of the lip formation to produce the sound symbolized. He does not suggest that the scribe who selected the mouthlike characters did so intentionally, but believes instead that the forms were chosen unconsciously. The letter "P," for instance, is represented by a sign suggestive of the closed lips used at the start of pronouncing it.

Submitted to War Dept
by Sgt. Nichols, Chautauque
Article in Nature
Science Service
7/3/31

Science Service 5/36 20

7/2/3



SIGN OF WHALEBOAT IN DAVITS POINTS WAY TO SHIPYARD

Days of historic whaling ships are recalled by a Massachusetts shipyard sign which shows a whaleboat, of the type in which the harpooners used to take off from the mother ship, slung to the davits. Even the ropes and tackle in the sign appear as they did in the old days. The shipyard is on the harbor opposite the famous old whaling port of New Bedford.

ALBUMEN IS MADE FROM COAL IN SYNTHETIC FOOD HUNT

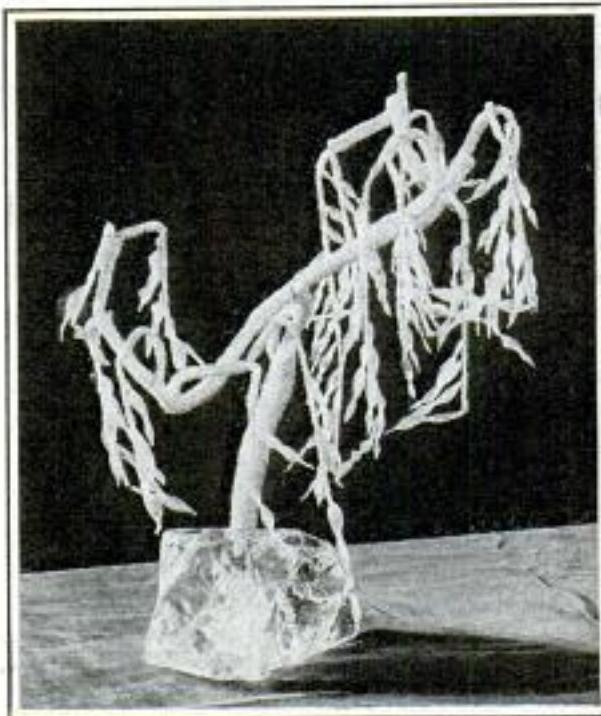
Albumen has been produced from coal in the hunt for synthetic foods. Prof. Wilhelm Gluud, a German scientist, who discovered the process, says it is possible to obtain all the elements of albumen from coal at a cost that will enable artificial albumen to compete easily with the natural product. The professor believes the world is on the verge of wresting synthetic sustenance from coal from which a man could live. The albumen is taken from amino acid that is found in coal and coke.

WOOD FOR PENCILS SO SCARCE ALASKA MAY SUPPLY IT

Supplies of pencil wood near large factories are becoming so limited, the industry now is investigating the utilization of Alaskan red cedar, the finest-grained wood grown in the northwest. Pencil wood must be soft, light yet strong, close and straight-grained and free from defects. The older the tree, the better pencil material it makes. Wood from the heart of aged logs that have lain for years in deep forests makes the best. Another possible substitute for cedar is Pacific coast myrtle. It is light, straight-grained, well scented and of good color. Both cedar and myrtle are immune from the effects of sudden climatic changes.

RARE "JADE" CARVING OF BEADS IMITATES CHINESE WARE

Rare Chinese carvings in jade, quartz, amethyst or other extremely hard substances, usually in the form of trees and flowers, the work of generations of Orientals, and therefore extremely costly, have been cleverly imitated. Wires are wrapped with tinsel, glass leaves are made to imitate the amethyst or jade, and glass beads are strung on the wires.



Costly Chinese Jade Ware Is Imitated in Figures
Made of Glass Beads and Wire

Eckhardt
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2/19/36
James

6/27/31

in address by Dr. E. C. Eckhardt
for Coal Research at
Bochum, Germany

91271 Cont. William Atherton 2d Pay
1869 Mintonwood Place, New York
Washington D.C.

Gold of All World's Mines Dwarfed by Oil Field

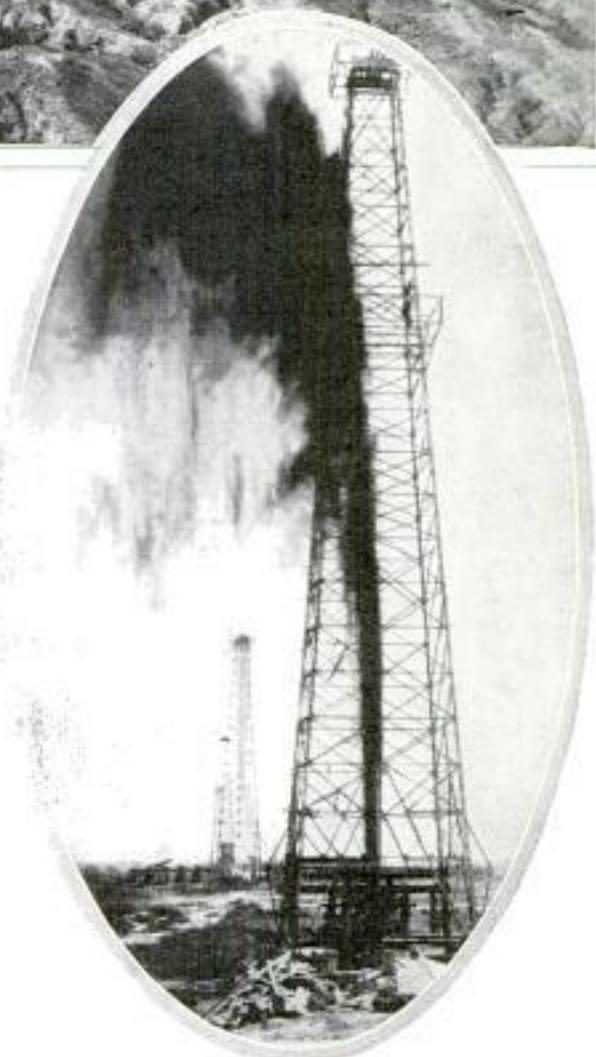


By RAY LYMAN WILBUR
Secretary of the Interior

A BROKEN, barren sunbaked ridge in California, five miles wide and thirty miles long, known as Kettleman Hills, has proved to be the richest oil field in the world and the greatest storehouse of wealth ever uncovered by man. There nature's oil tanks, a mile and a half underground, have been tapped by two score wells, and the flow, now restricted, may be started at any time as simply as one turns a spigot. When this is done, a forbidding strip of waste land, shunned and despised three brief years ago, will produce riches faster than it ever came from all the gold mines of the world combined.

The government, observing this possibility, and having considered the wastes incident to competitive development, has decided to use this oil field as an example in oil-field conservation so spectacular that all the world will take notice.

In an attempt to measure this oil bonanza, it may be compared to Cripple Creek, Colo., which reached the maximum of gold production in America from a



Above, Barren Land in Kettleman Hills, Selling for \$100,000 an Acre; Below, Well Out of Control



single field in 1900, when it yielded \$18,000,000; or the famous Comstock lode in Nevada, which, in 1877, produced \$14,000,000 worth of the yellow metal. When three wells had been brought in at Kettleman hills, that area was producing wealth faster than either of these gold fields at its maximum.

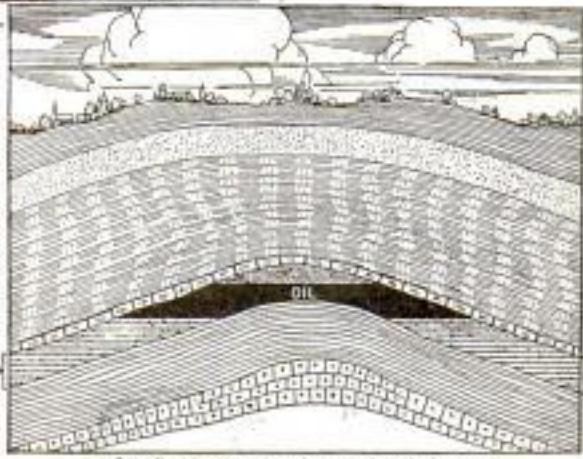
Mother Earth, molten in the heart of her, shrinking as she cools, here and there has made continent-long cracks in her ten-mile-thick crust. In milder moods she merely wrinkles it. Just this was done in California. A group of such wrinkles rambled for a hundred miles along the east fringe of San Joaquin valley. The geologists call them "anticlines." Wherever they are found, they say, it is worth while to look for oil.

An anticline is a formation made out of the earth's stratifications that is not unlike a great bathtub turned upside down. Deep below these inverted tubs, nature brews oil and gas out of water creatures that died millions of years ago. Nearly all of the gas has dissipated itself. Only these anticlines, and kindred for-

mations, form traps that catch it. Into them it may have crowded, always increasing its pressure, liquefying, rearing to go. Puncture the bottom of one of these topsy-turvy tubs and it hisses forth just as the gas in a ginger-ale bottle if a tack is driven into its cap.

The history of drilling in Kettleman hills reveals a generation's story of the increasing depth of oil wells. In 1900, half a dozen attempts were made in this area, ranging in depth from 600 to 1,000 feet. Later, more wells were started, some of them going down 5,000 to 6,000 feet and encountering many oil and gas showings, but nothing of value.

This deep drilling for oil is one of the mechanical marvels of the age. Conceive of the drill at the tip of a string of pipe, boring through the various rock strata of the earth, refusing to be stopped by flint-hard layers hundreds of feet thick, or diverted when glancing blows strike the sloping side of huge



Top, Oil Map of U. S.; Center, Gusher in a Lake of Oil; Bottom, Typical Foundation for Oil Field

91271

91416

boulders. Conceive this little tool at the end of a string of pipe, half a mile, a mile, a mile and a half long, feeling its way, meeting emergencies, leaving behind it a channel that will remain in place and carry without leakage a roaring and high-pressure torrent if the exploration turns out successfully.

So finally came Harris Hammond, son of John Hays Hammond, who decided to plunge for the fluid gold where others had failed. He drove a well 7,200 feet deep, at a cost of \$250,000, and found incomparably greater wealth than had his father in South Africa.

The government owned nearly half the Kettleman land, but had leased it for development. However, it could exert certain pressure on its lessees. So a policy of conservation was adopted. Special legislation was put through congress. A state law, prohibiting the production of oil until the gas coming up with it could be used, has gone into effect and is being fought through the California courts.

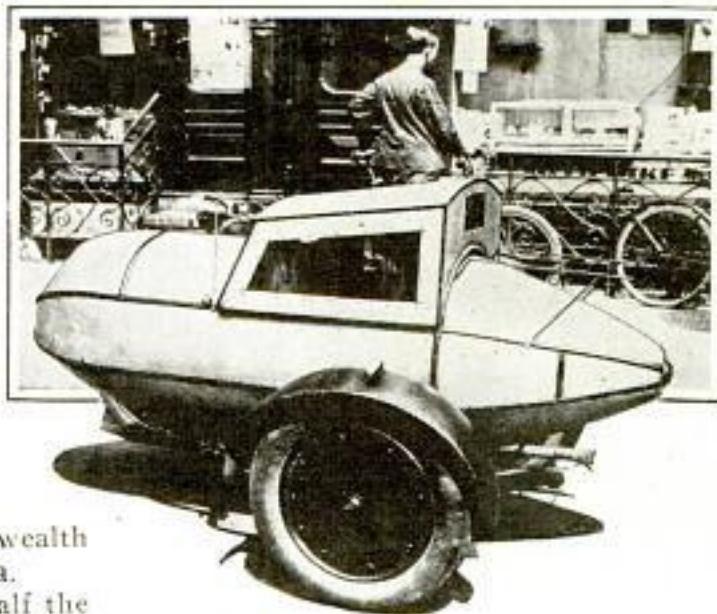
The result will be a systematic development of the field in order that its entire wealth may be conserved and ultimately used. Oil and gas will be produced only as it is needed. Gas sufficient to supply California for two generations will be saved instead of escaping into the air.

PUNCTURE-PROOF INNER TUBES LINED WITH PLASTIC

Puncture-proof inner tubes that repair themselves are now available to the motorist. Between two layers of cured rubber, these tubes have a lining of plastic rubber which forces its way into any opening and prevents air from escaping. The tubes are installed as easily as the ordinary kind and are built to fit in shape and size the tire with which they are to be used.



*Rubber Products Corp
3000 Michigan Ave
Chicago*



Streamlined Sidecar Reduces Wind Resistance to a Minimum; Note How the Car Follows Zeppelin Lines

ZEP SIDECAR FOR MOTORCYCLE CUTS WIND RESISTANCE

Wind resistance has been reduced almost to a minimum by a Zeppelin-shaped sidecar for motorcycles. The car, exhibited in Germany, is a one-man limousine, with front, side and rear windows.

WRECKERS START AT BOTTOM TO RAZE BIG BUILDINGS

91481

There are more ways to wreck a building than by starting with the lightning rod and working down to the basement. In fact, with time at so great a premium and with contractors tearing down buildings in one or two months that took one or two years to raise, the wrecker of big buildings nowadays starts at the bottom and works up. All bulky and valuable objects in the basement now are cleared out first, and the men work up, floor by floor, to the top, gathering what material can be salvaged, and cutting holes through the floors and ceilings. Then the building starts to come down about a floor a day. Bricks, stones and other material are dropped through the holes into the basement, where steam shovels pick up the rubble, place it into trucks and it is carted off. As the steel work is exposed, it is cut away with torches and sold for remelting or used to shore up other construction, such as subways.

Albert A. Volk & Co.

*1879 Broadway
New York*

Making Home Tasks

a1365



Left. Automatic Electric Iron for the Home; Ironing Pad Is Vibrated by a Small Motor Which Pats Out Wrinkles Instead of Applying Pressure

a1371 4



Right. Small Flashlight with Loop Handle Which Stands at Any Angle

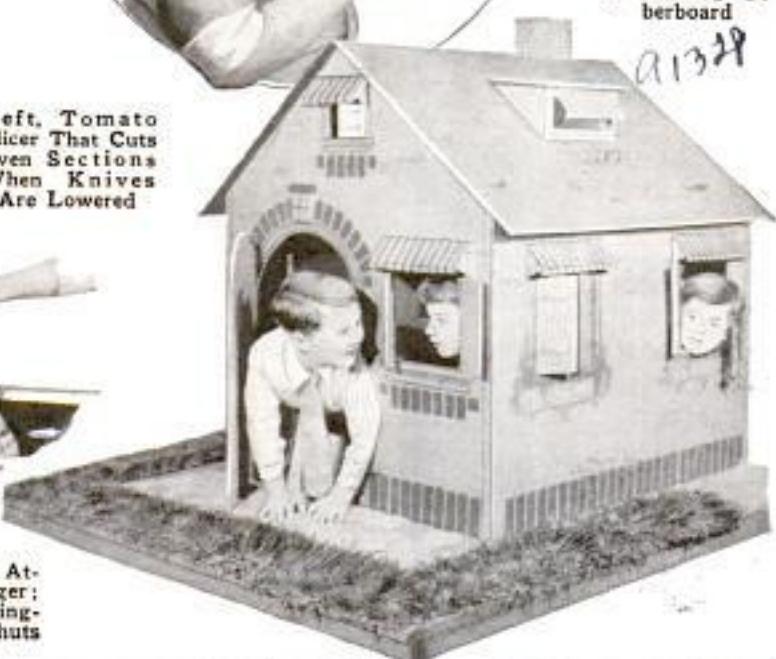


Above. Automatic Safety Attachment for Electric Wringer; If Hand Is Drawn into Wringer, Feed Belt Rises and Shuts Off Power



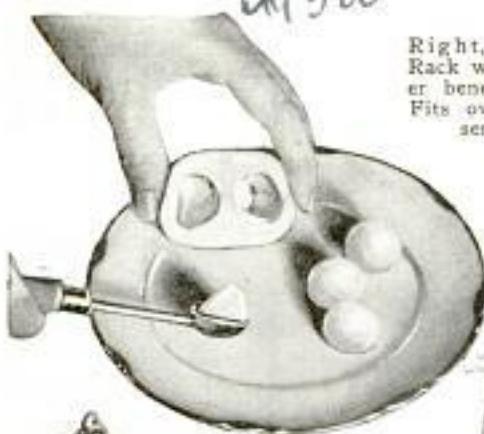
Left. Machine-Gun Bubble Blower That Shoots Stream of Bubbles into the Air

Below, a Playhouse for the Children Made of Sturdy Fiberboard



a Pleasure

a1300



Right, Folding Clothes Rack with Electric Heater beneath It; a Cover Fits over Rack to Conserve the Heat

a1384



Above, Hemispherical Spoon for Cutting Fruit or Other Foods into Fancy Balls; Left, Air-Tight Bottle Stopper That Is Applied Easily by Hand

a1226



a1521
Left, Handy Flour Sifter That Opens When Handle Is Pressed; It Can Also Be Used as a Strainer and for Removing Eggs from Hot Water



Above, Metal Plate for Campers Divided into Three Compartments

a1375



Right, Wall Paper Covered with a Cellulose Coating Which Makes It Washable; the Coating Also Resists Dirt



a 1968
432

Experimental plot handled by
Pacific Commercial Co.
and U.S. Bureau of
POPULAR MECHANICS
August 1968
Plant Industry



Photo by Ewing Galloway
Tractor at Work in a Philippine Rice Field and, beside It, a Carabao Which
Formerly Did the Work Machines Now Are Doing

TRACTORS INVADE RICE FIELDS TO SUPPLANT CARABAO

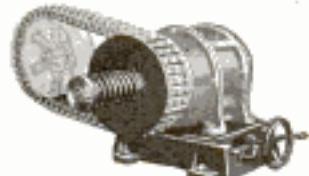
Antiquated methods of production are gradually giving way to modern machinery in the Philippine rice fields. For years the carabao, a kind of water buffalo, has been the one means of power that could perform successfully in the water and heavy mud of the rice paddies. Now, however, tractors are doing a large amount of this work and are supplemented by modern threshing machines and rice mills.

VARI-SPEED PULLEY ABOLISHES GEARS AND CHAINS

Several speeds are available in a motor pulley which is mounted directly on the

motor shaft and forms the driving element between the motor and the driven shaft. Auxiliary equipment, such as

chain drives and gears, is eliminated by this pulley. The design and construction details are unusually simple, the speed



Reeves Pulley Co.
Columbus, Ind.

Edited by
Mr. H. J.
Smiley and
Mr. L. Vaughan

varied by turning a hand-wheel for any speed between a ratio limitation of three to one.

ULTRAVIOLET-RAY BATH FOR COLDS

a 1965

Reduction of fifty-three per cent in the frequency of colds among a group of fourteen Cornell University women is the latest record in the battle to stamp out this common health menace. Seventy-five men taking the Cornell treatment showed a reduction of forty-two per cent. The treatment is simple, but the most important phase of it is an ultraviolet bath of from ten to fifteen minutes duration each week. In addition regular doses of some

alkali are given twice each day. Diet restrictions are imposed, ventilation recommendations are given, and eight hours' sleep each night is insisted upon.

CARBON PAPER IS ELIMINATED BY DOUBLE RIBBONS

Duplicate copies now can be made on a typewriter without using carbon paper by means of an attachment that fits on the carriage and contains two extra spools of ribbon, synchro-

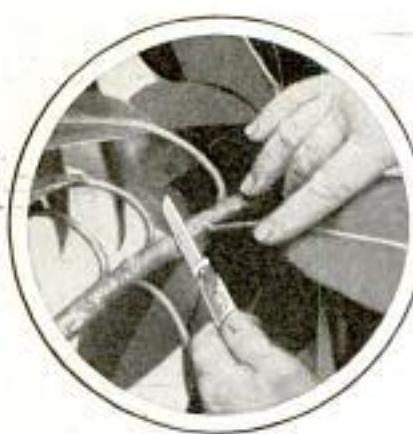
nized with the regular ribbon. Each of the extra ribbons fits between two sheets, enabling five copies to be made simultaneously. The ribbons wind from side to side as does the original, and after a key is struck, a release movement allows the carriage to move to the left without interference. The extra ribbons drop into place between the sheets at the touch of a lever.



Original Copywriter Co.
Northern Copywriter
Seattle Wash.

Chicago - 39th Street

Rubber-Plant Botany in Your Own Home



U 44
Rubber Plants in the Home Can Be Increased by the Method Shown Above, Which Involves Cutting Away a Few Leaves, Wrapping the Cut in Moss, and Watering Until Roots Sprout

Housewives who grow rubber plants as an adornment for the home can increase the number of such plants by a simple process that is being employed successfully by some botanical gardens. Three or four leaves are cut away from a branch, care being taken not to injure the eye at the base of each leaf. Moss is wrapped around the cuts and the tapped branch and moss are watered occasionally. When roots begin to sprout from the moss wrapping, the branch is cut from the plant close to the moss and placed in another pot where it is given a start in life. Two or more tappings can be made simultaneously on one healthy plant.

GHOST NEBULÆ MADE VISIBLE BY EYE OF BIG CAMERA

97345
Roving island universes in the vast recesses of the sky are being pictured by the giant camera at Mt. Wilson observatory as they were millions of years ago, not as they are today. These ghost pictures are being obtained, explains Dr. Edwin Hubble, because the groups are so far away that light from them, traveling 186,000 miles a second, takes from 100,000,000 to 250,000,000 years to reach the earth. Thus, when a picture is obtained, it is only a view of what they were that long ago. These nebulae average about 100,000,000 times as bright as the sun, but are seen only as faint points of light by the most powerful telescopes. The stellar

system of some 30,000,000,000 stars is but one island universe, known as the Milky Way galaxy, and it spreads over an area represented in miles by the figure 960 followed by fifteen ciphers. It is beyond this that the work of the star explorers begins. It is estimated that about 30,000,000 island universes are within reach of the Mt. Wilson telescope.

ROLLER MADE FROM OLD AUTO KEEPES TENNIS COURTS FIT

91290
Tennis courts of one club at Lincoln, Nebr., are kept in condition with a roller made from material found in an automobile junkyard. It is mounted on an auto chassis and driven by an old car motor. The implement weighs 2,500 pounds, and can do the work of five men, rolling seven courts in about fifteen minutes.



Tennis-Court Roller Made from Parts Found in Auto Junkyard; It Does Work of Five Men

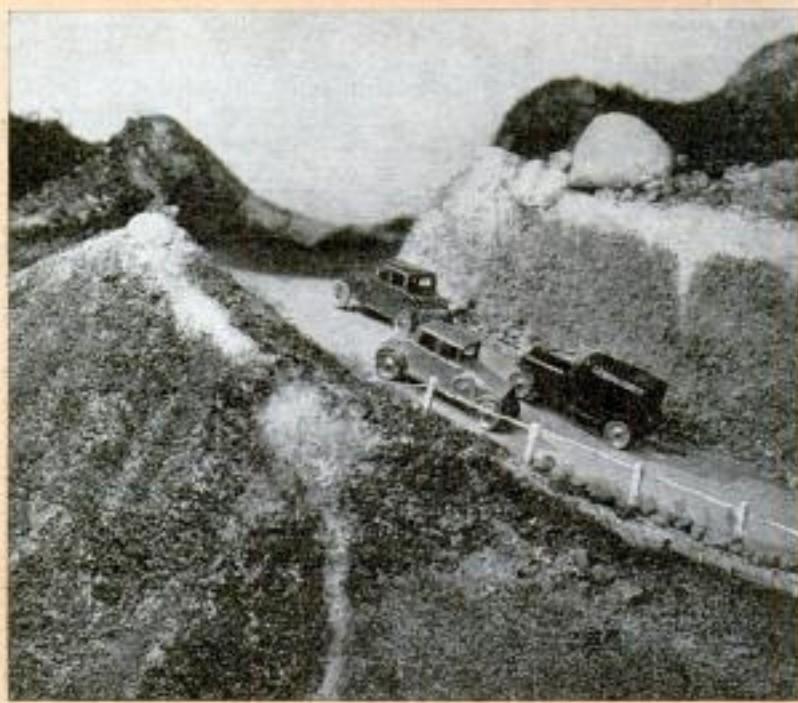
Tribune 6/18/31

*and Joe Starnore
Lincoln, Neb.*

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a1126 Cont. Uthai, Vincent Weber
1331 Is St. NW
Washington, D.C.

Are You a



The Wrong and the Right Way to Drive over a Hill: Attempting to Pass Will Cause a Collision or the Downcoming Car Will Leave the Road

DO YOU belong to the grand army of "turtle drivers"? Or do you qualify as a "street ostrich," a "sidewalk edger," a "green gazer" or a "red rusher"?

Let's hope you can answer no to all questions. For these queer and striking terms, just devised by Ernest N. Smith, of the American Automobile association,

"Worse than War" Toll of Fifty Thousand Auto Deaths Is Largely Due to Disregard of Rules

refer to certain all-too-common types of automobile drivers and pedestrians who, through carelessness or indifference, cause most of the serious motor-vehicle accidents in this country. And last year there were 835,250, with 32,500 deaths.

Probably the worst offender is the turtle driver. His name fits him perfectly, Mr. Smith says, because he has the habit of sitting at the wheel with his head down like a turtle in its shell, and literally shutting his eyes to whatever is happening on the road. He's the chap who whizzes past you on your right and then bawls you out if you clip him; who makes a devious and sudden turn without trou-

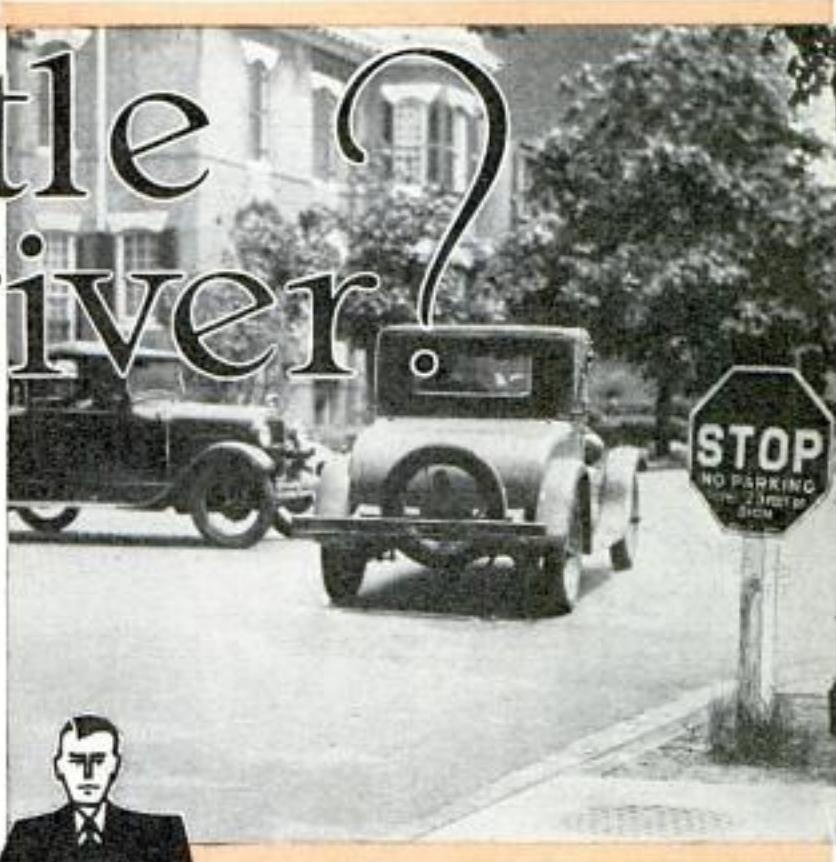
bling to put out his hand; who disregards a boulevard sign, or backs out of an alley at twenty-five miles an hour.

A close second, as an ever-present menace to safety, is the street ostrich. He's the type of pedestrian who might be called the sidewalk counterpart of the turtle driver. One minute you'll note

Turtle Driver?

him aping the ostrich, shambling carelessly along a crowded intersection reading a newspaper; later on, he'll dash blindly from behind a parked car, and later still, will jay-walk in the middle of a congested street crossing.

As for the sidewalk edger, he has the annoying and perilous habit of



0-4 YRS. 5-14 YRS. 15-54 YRS. 55 YRS. OVER

Courtesy of Travelers Insurance Co.

The Turtle Driver in Action. Disregarding Boulevard Stops; Below, the Dangerous Ages from an Automobile-Fatality Standpoint

walking alongside the curb instead of on the sidewalk. Thus he places himself in the very path of automobiles traveling from the rear. Sooner or later he becomes the direct cause of an accident to himself or others.

Maybe the green gazer isn't as dangerous as the edger, but he's just as annoying. He's the kind of driver whose mind apparently falls fast asleep while the traffic lights are changing. Often the green light will be on fully ten seconds before he discovers the fact and steps on the gas. Meantime horns are blowing,

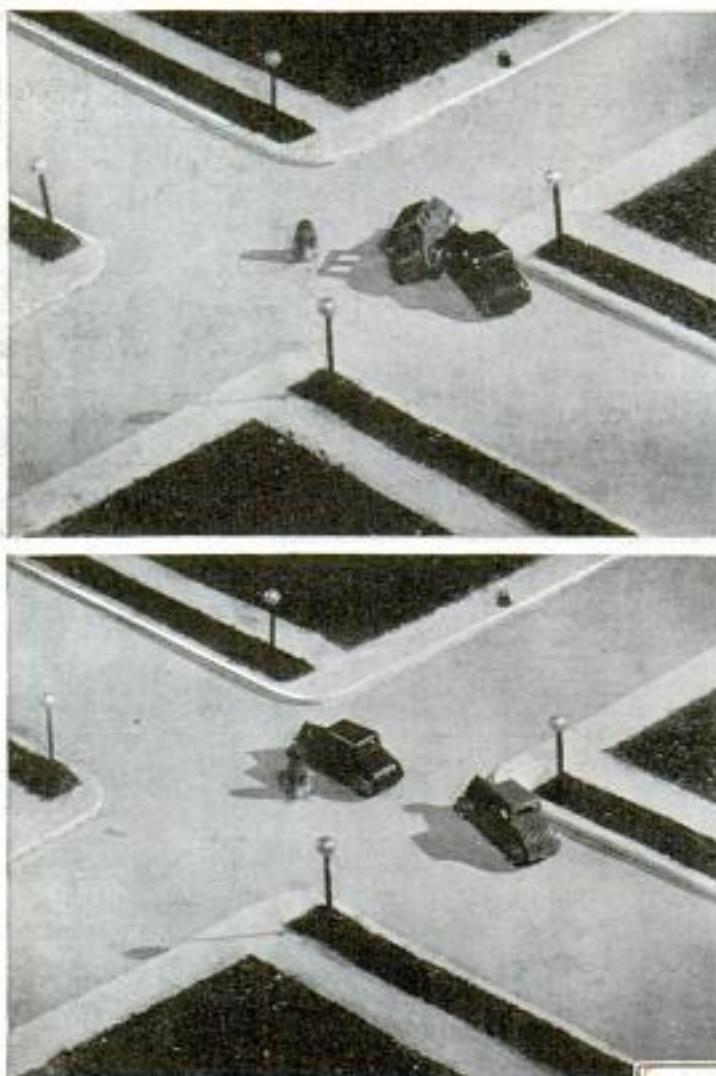
autoists behind him are yowling, and many people are forced to miss the light who should easily have made it.

Just the opposite type of driver is the red rusher. Instead of being slow on catching the traffic lights, he's usually a second or so ahead of them. Speeding through a crowded intersection, he's extremely likely at any moment to strike another car or a pedestrian.

Even those of us who claim to be good drivers needn't feel proud, Mr. Smith says, for if our memory is accurate, then we'll usually discover that, at times, we have given excellent imitations of most of the human menaces to safety that have been mentioned.

Nor is the experienced driver necessarily a careful one. This is proved conclusively by the fact that about ninety-one per cent of the drivers involved in fatal and non-fatal accidents in 1930 had handled a car for more than a year.

Which causes most accidents, pedes-



When Making a Turn, Stay on the Side to Which You Will Circle; Above, the Wrong Way

trian or driver? According to an official study made by the American Automobile association, last year drivers were responsible for more than three times as many vehicle accidents as pedestrians, more than twice the number of fatalities and around four times the number of persons injured.

But this doesn't mean that pedestrians do not cause their share of harm. More than 7,000 pedestrians met death during the year in automobile mishaps primarily through their own fault; while less than half that number were killed because of the actions of drivers. Moreover, the injuring of more than 150,000 persons was traceable to the actions of pedestrians and over 45,000 to motorists, while more than 110,000 injuries were due to the actions of both.

Nearly three-fifths of the 1930 accidents due to improper driving were traceable to three specific violations: failing to grant the right of way, exceeding the speed limit and driving on the wrong side of the road. The worst of these was the first, causing thirty-one per cent of all accidents due to improper driving. Exceeding the speed limit came a close second, being responsible for twenty-one per cent; while driving on the wrong side of the road accounted for sixteen per cent. These violations also caused around sixty-nine per cent of the total number injuries to persons as a result of actions of drivers.

Other major causes of accidents due largely to the driver's fault, are these, in the order named: failing to signal; cutting in; passing a standing street car; passing on a curve or hill, and passing on the right-hand side.

What's the most dangerous place on the road for both pedestrian and motorist? Mr. Smith answers this question by pointing out that, last year, nearly twice as many accidents occurred at in-



Proposed International Signals; No Words Will Be Used, so They Will Be Intelligible to All

9/11/26

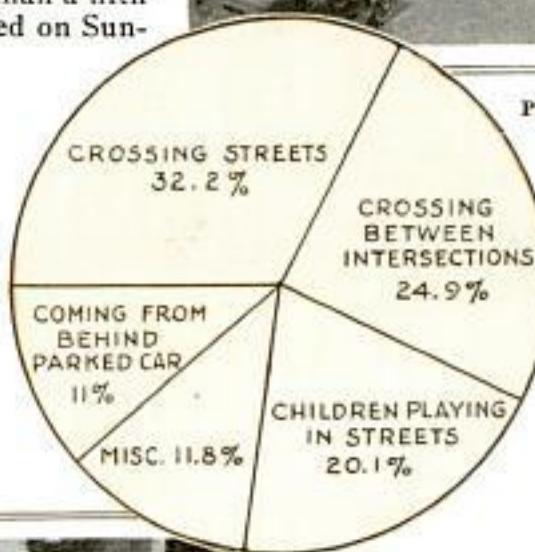
tersections as between intersections. Careless pedestrians who crossed between intersections caused more than twenty-four per cent of the 1930 accidents; crossing intersections where there was no signal light accounted for about twelve per cent of the total; crossing intersections against signals caused over ten per cent of the total, and coming from behind a parked car accounted for about eleven per cent.

Certainly you might call Sunday the "jinx day" of the week for the autoist. More than a fifth of all fatalities happened on Sunday, with Saturday, Friday and Monday ranking in order in the number of deaths.

Mr. Average Motorist would do well to think over carefully these splendid little rules for road safety, recently prepared by the Auto Club of Missouri:



Photos Courtesy Bureau of Public Roads



"Yield right of way to all street cars at intersections; watch out for one-way streets; be sure to pull immediately to curb and stop for fire, police or emergency vehicles; always keep to the right unless traffic lanes direct otherwise; never fail to stop before crossing sidewalk when emerging from alley or private driveway; learn to use the brake instead of the horn and the gas."



Intersections Are Most Dangerous; How Pedestrians Caused Accidents, and the "Street Ostrich"

WASPS AND FLIES IMPORTED TO FIGHT CANE BORER

Insects from Argentina and Peru have been imported by the department of agriculture to fight the sugar-cane borer in Louisiana. The borer has cost Louisiana growers \$3,500,000 a year by drilling holes in the cane, depositing larvae, causing red rot and often killing the plant. Two natural enemies of the borer were found in a world-wide hunt, a wasp in Argentina and the Peruvian fly. The larvae of both feed on the borer. Entomologists say the imported insects subsist on juices sucked from plants when they cannot find borers to feed on, and that the wasp and fly have established for themselves a record of not becoming crop pests.

*Conf. W. D. Robinson
Pass Christian Miss.*

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438

POPULAR MECHANICS

Ancient "Iron Horse" Comes Back to Life



134
Fifty-Year-Old Locomotive Pulling Ancient Train
in a Recent Railroad Jubilee

en-anniversary celebration at Hudson, Wis., where a stagecoach and men and women in costumes of the early eighties provided atmosphere for the old-time engine. The engine, which was exhibited with considerable pride fifty years ago as the very latest thing in railroad equipment, cost \$8,450.

1346

BANISHMENT OF THE COW IS SEEN AS FARM ADVANCE

Challenging the cow, Dr. E. A. White, of Chicago, told a farm meeting that engineers might well question her efficiency as a producer of food. "Look at all the work required," he said. "Why should the human race be compelled to feed, clean and milk cows twice daily, 365 days a year, in order to obtain fats, minerals and vitamins? The engineer is interested in a better way, and therefore will join hands with the chemist in the production and utilization of vegetable fats. There is every reason to believe

Proceeding under its own power, the grandfather among locomotives of the Chicago, St. Paul, Minneapolis and Omaha railway recently participated in a gold-

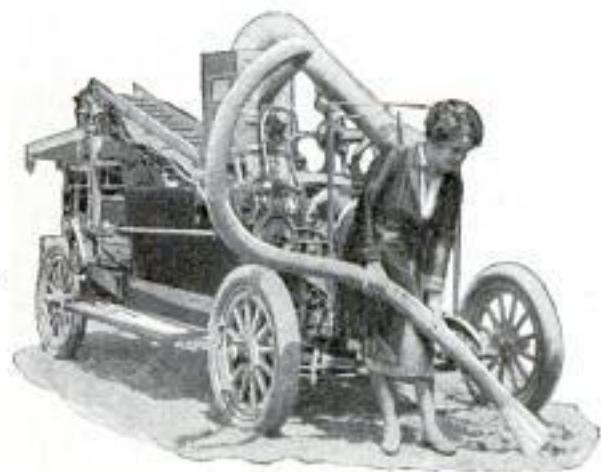
*American Society of Agricultural Engineers
and State College Games*

that, ten years hence, butter will be facing much more intense competition than is the case today. Why, these chemists yet may have us eating alfalfa."

A 1269

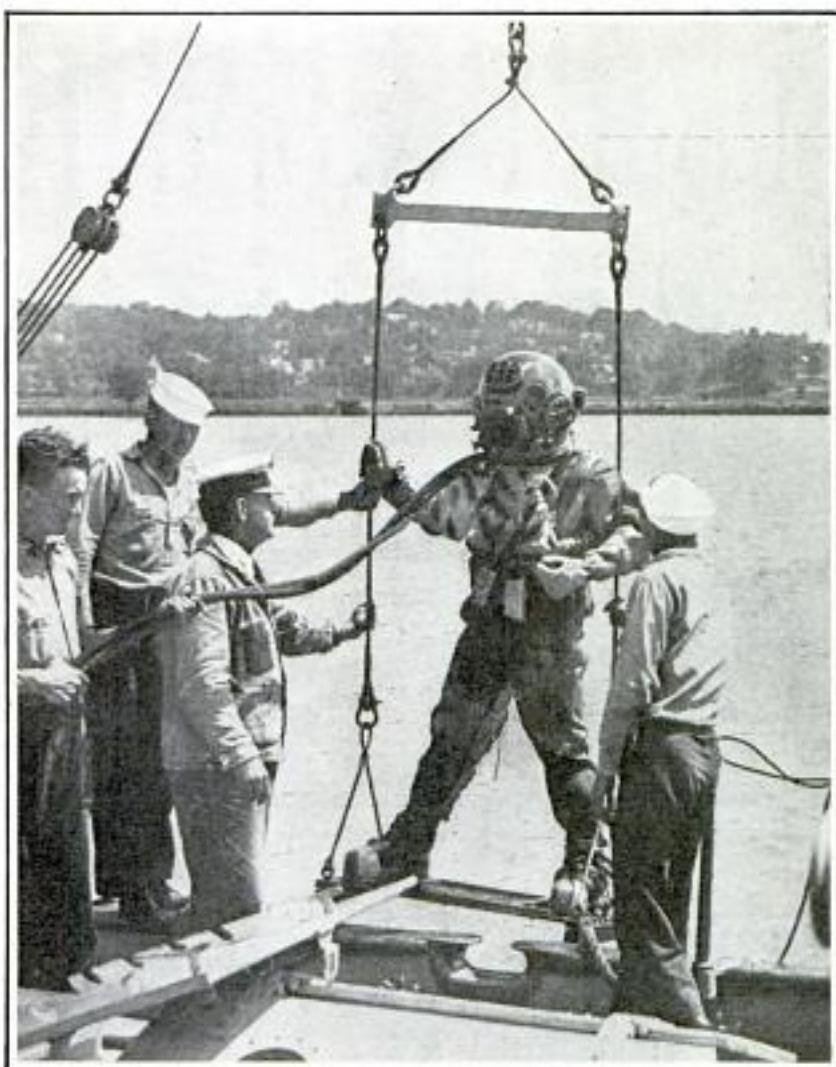
SUCTION GATHERS FRUIT SHAKEN FROM TREES

In large prune orchards, the ripe fruit is shaken from the trees, then picked up and packed. To lessen the cost of harvesting, a suction picker has been invented, which is mounted on an automobile chassis and operated by the car engine. A fan sucks the prunes through a hose which deposits them on a conveyor belt, so constructed that leaves and smaller particles of dirt drop to the ground as the fruit travels along it. Larger clods are eliminated when the prunes drop on pins arranged in rows along a drum. When this is at the bottom of its revolution, a steel strip knocks the fruit into a box and dirt and stones are pushed aside. The machine picks about fifty tons of prunes a day and can be used also for other fruit.



Mechanical Fruit Picker Which Employs Suction to Gather Prunes and Other Fruit from Ground

*Dr. James Slotto
13639 S. First St.
San Jose, Calif.*



@ U. & U.
Student Diver Preparing to Submerge at the Navy's Diving School at the Washington Yard on the Potomac River

DIVERS GO TO SCHOOL IN RIVER FOR NAVAL INSTRUCTION

Training of deep-sea divers, including practical instruction in the Potomac river, is one of the activities at the Washington navy yard. The naval scholars receive their underwater instruction also in special high-pressure tanks which simulate conditions at great depths.

A 1355

AIRPLANES BOW TO SNAILS

Snails infected with bilharziasis, a disease known to soldiers in the world war, have routed a squadron of the British royal air forces. The squadron had chosen a site near Bagdad for establishment of a base, but were forced to move to prevent infection of the men when the site was found swarming with the diseased snails.

*Kans. City Star.
6/18/31*

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a 1014

Round the World Perils



of the

Courtesy Supermarine Aviation Works
Natives Scrape the Barnacles and Other Marine Growths from the Hull of a British Seaplane after a Long Flight over the Water in the Far East

*29. Begin Again By HAROLD T. WILKINS leg Colombia
Over the Way Death in London Eng*

PICTURE a desolate landscape of rolling sand, scorched by hot winds blowing from far inland over the desolate wastes of the Rio de Oro to the unpeopled northwest African shores of the Atlantic. You would have to travel 4,000 miles to the West Indies before you met a civilized person, unless it were aboard some steamship plowing her way southward.

Here is one of the world's loneliest and most dangerous airways. Two airplanes are droning over the skyline from the river Wadi Draa and the distant Atlas mountains. Past Cape Juby, they hug the coast so as to avoid a forced landing on the desert floor. One of the planes seems to be in trouble. It is flying low over the dunes by the sea. Loss of oil or, perhaps, an engine defect compels it to land.

The second plane, seeing the plight of its fellow, comes lower. It is about to land to pick up the stranded mail and pilot and then take off again to fly to the west African port of Dakar, in French Senegal.

"Crash!" The undercarriage hits a boulder concealed under the sand. The plane tilts over and spills out the pilot and observer. Hidden behind the dunes inland, a cutthroat gang of sharp-sighted, sharp-shooting nomads have spotted the two planes. They creep along the sand gulleys toward them and open fire on the airmen. The pilots take refuge behind wings and fuselage. Unless a rescuing plane zooms over from the distant mountains to the north, the pilots are in for a hectic time, in which kidnapping will be the least hurtful thing that may happen to them.

Such incidents were more frequent three years ago than they are today on the "African Adventure Airways," which the French Compagnie Aeropostale runs down south from Rabat and Casablanca, in Morocco, to the Senegalese port of Dakar, which is the jumping-off place of the airline to South America, across the Atlantic to the mid-ocean islands of Fernando Noronha, and the mainland of Brazil at Port Natal.

Not long ago, three airmen of the Com-

9/10/4



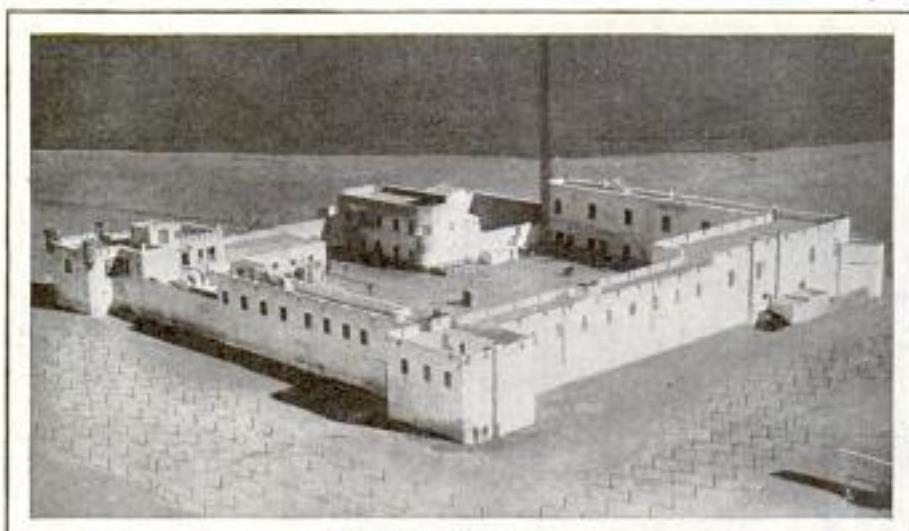
Courtesy The Graphic

Plane Sights Stranded Flyers in the Mountains and Drops Them a Spirit Stove, Bandages and Food and Water by Parachute

pagnie Aeropostale set out to rescue the crew of a stranded steamer. The nomadic Arabs came on the scene, but were met by a fusillade of bullets and driven back. They then flew the shipwrecked men to Port Etienne and safety. Later, a pilot was caught with a broken undercarriage while his ship lay on the dunes. The Arabs kidnapped him, put him on the back of a fast-trotting camel and took him to a desert fastness, where he endured great hardships until he was ransomed. A few weeks later, two French airplane pilots, named Gourp and Erable, with a mechanic, named Pintado, and a Moorish interpreter, landed on the desert off the Rio de Oro, when a force of Arabs, headed by a renegade from a French regiment of Spahis (Algerian cavalry) arrived and

took the men prisoners. The Arabs themselves were disposed to listen to the interpreter's suggestions about a ransom, but the renegade with his own hand shot one of the pilots and the mechanic and badly wounded Gourp.

Many French and Spanish airplanes recently made a sweep over the deserts of



Photos Courtesy Henri Bouche

Air View of Spanish Fort in the Heart of the Desert, Africa; Below, Result of a Blizzard in the Andes

the Rio de Oro—river of gold as the Spanish territory in this wild region of northwest Africa is called. There is no river there, and nothing but sand and waste. The combined air squadrons were trying to solve the mystery of two missing airplanes. In one machine was Commandant

Burguett and a Moorish chieftain, named Taleb Buya; in the other, Captain Nunez and a mechanic. While planes sped over the desert and observers scanned the wastes with binoculars, cavalry and camel troops scoured the desert below. The two planes had disappeared, swallowed up in the night of the unknown Sahara of the northwest.

"SOS, SOS, SOS. We are down on the water South Atlantic. Lat... Long... Loss of oil. Hurry rescue boats. Mermoz." This radio, recently flashed to the port of Dakar, announced a misadventure to the French pilots who had attempted the first air-mail crossing of the south Atlantic from Natal to Dakar. The radio galvanized into activity a fleet of fast motor "breakdown-gang" boats which rushed to the rescue of the plane. With his radio, and the international code, the pilot was able to keep in constant touch with the motorboats, until, in the nick of

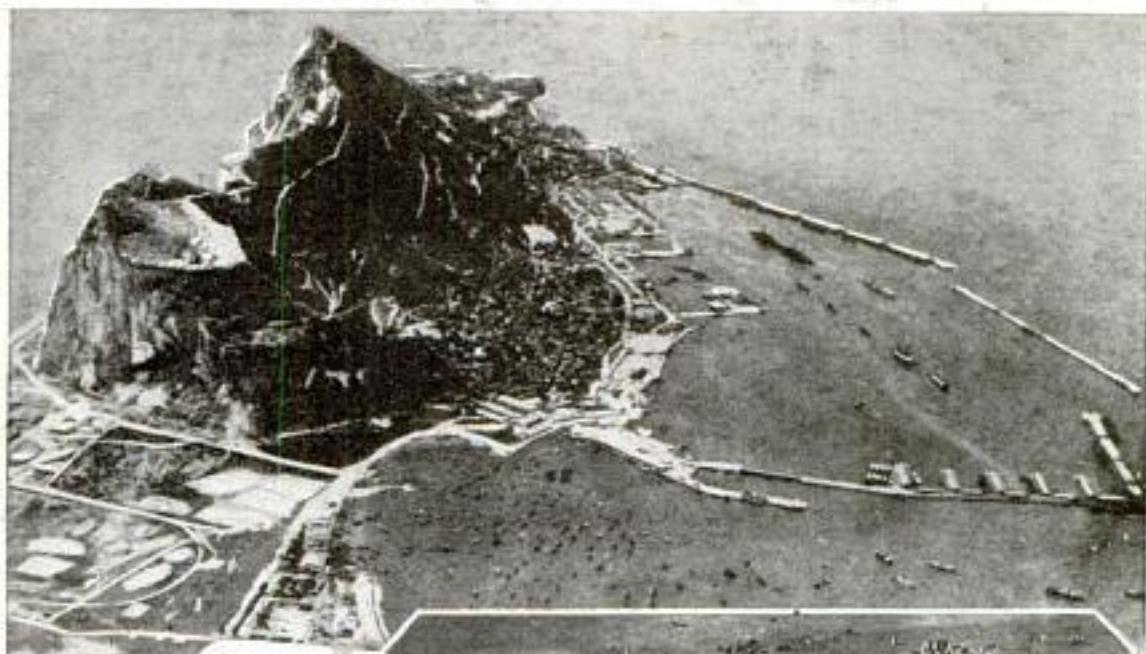
time, he was rescued just as a heavy storm was approaching. The mails were taken off, but the seaplane went to the bottom in the gale.

There also is the recent case of three French airmen who

set out to blaze a trail for commercial and passenger airplanes across the west African Sahara. Aboard one plane, they left Gao on the River Niger, to fly to Reggan, in Morocco, which they should have reached the same day. They did not arrive, and the French military authorities became anxious, and sent out planes and fast autos to search the desert. Days later, an Arab wandered into a military outpost and said he had seen a smashed airplane lying on the desert about 300 miles south. A physician was rushed by air, to find native troops surrounding a machine, while the pilot, M. Goulette, lay badly hurt.

Herr Ernst Udet, the German "ace," told, a few weeks back, a remarkable story of an aerial adventure he had in the African wilds, when he was making a film of animal life.

"A powerful lion suddenly sprang at the airplane, while we were flying low to



Photos Courtesy Henri Bouche

A French Aeropostale Liner Catches Sight of the Famous British Fortress of Gibraltar on the Southern Tip of Spain While Bound for Dakar, West Africa, across the Moroccan Atlas Mountains, via Rio de Oro in Northwest Africa; at the Right Is Seen an Arab Market in the Desert near One of the Lone Outposts of the Rio de Oro on the Airline from Paris to Buenos Aires; the Senegalese Port of Dakar Is the Jumping-Off Place for This Transatlantic Service



© Planet News, London
A Crew, Stranded in Arctic Wastes, Signals to Planes Passing Overhead for Aid, by Placing Tent Poles and Other Pieces of Wood on the Surface of the Snow to Form the Word "Help"; If the Planes Are Unable to Land, They Drop Food



Courtesy Imperial Airways

A/1014

take pictures. A wing was badly damaged, and it was only with the greatest difficulty we landed. The airplane was hardly on the ground before an angry rhinoceros attacked and injured my pilot. Our second machine was quickly on the spot, and the crew drove off the animal and rescued our men.

"Again, in March, 1931, I was stranded on the sandy wastes in the dangerous Nile-Sudd country. I had run out of gasoline and was forced to land without food, water or radio, or any means of communicating with the outside world. Hours passed. Suddenly, I looked up into the sky and saw, with indescribable relief, a plane passing overhead. It came lower. Yes, the pilot had noticed my plight! There was great risk in attempting to land on such marshy terrain, but the pilot took that risk. He was Capt. Campbell Black, flying solo from Nairobi, in East Central Africa, to England.

"'I heard you were missing,' he said to me. 'They told me at Nairobi that you left for Khartum down the Nile in the Sudan... Well, I'll give you all I can to help you out of your fix.' He chivalrously shared his own slender rations of water and biscuits, and 'Sorry, Herr Udet,'

he said, 'I can't give you gas to enable your machine to reach the nearest depot. But I'll send help from Juba. Good-bye.'

Mountaineering by airplane recently has added some unexpected thrills to the already exciting life of a transcontinental mail pilot. M. Guillaumet, known as "the courier or 'air-post boy' of the Andes," was flying 21,000 feet above a range in



Courtesy Henry Rouche

Above, Airdrome en Route from Cairo to Bagdad; Below, the Spanish Fort of Cape Juby Where Rescue Planes Are Kept

the Cordillera of the Andes, while carrying mails from Santiago to Mendoza, on the Argentine side, en route for the South American air-mail line from Buenos Aires to Dakar, in West Africa, and Paris, when, "suddenly," he says, "I found myself surrounded by clouds. I entirely lost my sense of direction. Then a tempestuous wind raged. My machine spun out of control. I felt I was dangerously losing altitude. I crashed in a basin on a mountain nearly three miles high. The machine turned turtle and flung me out onto the snow. The plane was badly damaged, but my fall was broken on the soft snow. Hours later, I saw an airplane pass overhead. I waved frantically, but the pilot did not notice my signals. Night was falling.

"The cold at that great height was intense. To keep myself from perishing

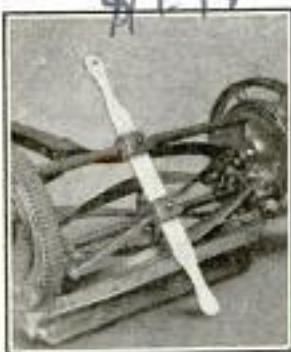
a1252

from cold, I decided to walk to civilization. The region is entirely deserted, and the nearest help is at an Argentine frontier post. I strapped the mail on my back, and marched across ice-packed gullies and over snowy ranges, for seventy hours without a stop. I had to go on. To halt was to die of cold. The first day I traveled slowly. I tumbled into a ravine 150 feet deep. I escaped with bruises and a severe shaking. In one day I covered only two miles. At last, after four endless days, I staggered, with bleeding and frost-bitten feet, into the porch of a lonely ranch, where I was given food and restoratives and put into touch with the Argentine frontier guard."

On the other side of the globe, in the Swiss-Italian Alps, the experience of M. Guillaumet recently had a parallel in the adventures of five Swiss soldiers who lost their way during the maneuvers in the region of St. Gotthard. All night they wandered around in the blizzard, trying to shelter under the lee of rocks, till the intense cold drove them out again. Luckily, an airplane located them, dropped food and a map, and put the lost soldiers on the way to an outpost which they reached in safety.

a1325

FILE FOR LAWNMOWER BLADE SHARPENS ACCURATELY



Lawnmowers are sharpened by application of a simple, light file to the moving blades by an Indiana company. The lawnmower wheels are raised from the ground, the bedplate, or part of the ma-

chine just below the blades is loosened and the sharpener applied to the blade. As the blade is revolved, the sharpener is moved back and forth with an even pressure. Approximately the same number of strokes must be used on each blade.

Clyde Iron Works Inc.
A mica-insulated spark plug, completely shielded against radio interference, is now being produced.

*W.L.S. Corporation,
136 W. 42nd St.
New York*



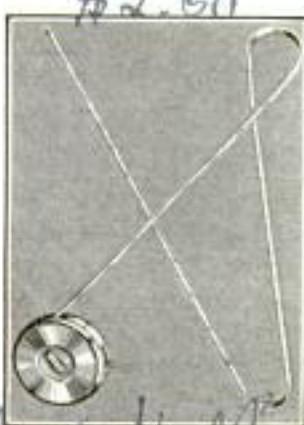
Portable Crane Used to Reach Nesting Places of Pigeons That Damage London Buildings

CRANE HELPS TO ROUT PIGEONS NESTING ON BUILDINGS

Hordes of pigeons do heavy damage to buildings in some parts of London, and removing them and their nests from lofty perches has long been a difficult problem. One man now is employing a large portable crane for the purpose. The crane is elevated to a point within reach of the nesting places, and the man climbs along it to remove the birds and nests.

RULE JUMPS OUT OF ITS CASE WHEN YOU PRESS BUTTON

Combining the rigidity of a measuring rod with the flexibility of tape, a steel rule which can be propelled from its case by pressing a button, or extended manually, is now available. It is made for measuring out-of-the-way places, around corners, and curved surfaces, and also is convenient for general home use.



*may have Steel Product
cls. 121.00
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21 all. mass.*

*Encl. E.C. Schuyler mach 22 1949
6 W New York*

cont. S.A. Lewis 336 Broadway
Bldg. Los Angeles, Calif.

POPULAR MECHANICS

446

a 188

Dr. H. Lange
A. Branch

a 1366

U.S. Berlin

POWERFUL X-RAY FROM LIGHTNING IS FORESEEN

X-rays as penetrating as cosmic rays, with voltages of 18,000,000, are predicted by two German scientists who already have made a tube tested at 3,000,000 volts. Working in a narrow valley between two mountain peaks in Italy, the scientists set up a gathering system which collects energy from the skies during thunderstorms to obtain a twenty-five foot spark of 18,000,000 volts. Assured that nature would provide the high-tension discharge needed, they constructed an X-ray tube



Sheet-Metal Ceiling Illuminated by Hidden Lights Which Make It Appear Like Colored Glass of a Modernistic Pattern

HIDDEN LIGHTS MAKE CEILING SHINE MYSTERIOUSLY

Sheet metal and hidden lights have been combined to convert the ceiling and upper walls of one San Francisco cafe into a semblance of colored glass. For the ceiling and parts of the walls, sections of metal were arranged in geometric patterns giving a somewhat modernistic touch. Colored lamps were placed above the metal ceiling and the light was projected against the back of the sections, being reflected through slots between them onto the under surfaces. Five colors are used, and these are connected with a system of dimmers, operated by remote control from the orchestra pit. At times, the ceiling appears to be red-hot and again it seems icy-cold.

A 1342 AUTOS CRASH INTO TRAINS

Twenty-five per cent of highway grade-crossing accidents in 1930 resulted from operators of automobiles, busses, trucks and motorcycles crashing into the side of trains. Railroads report 1,276 such accidents. Of this number, 1,130 automobiles were driven into the side of trains, killing 214 persons. There was a decrease in the number of these accidents from 1929.

T.C.C. report

of alternate rings of rubber and metal which took 3,000,000 volts for one-millionth of a second. These X-rays are the most powerful yet produced, and electrons are so speeded up in the tube, less than a dozen feet long, that they drill holes, an inch deep, in a brass plate. An ordinary X-ray tube would need to be half a mile long to withstand such voltages.

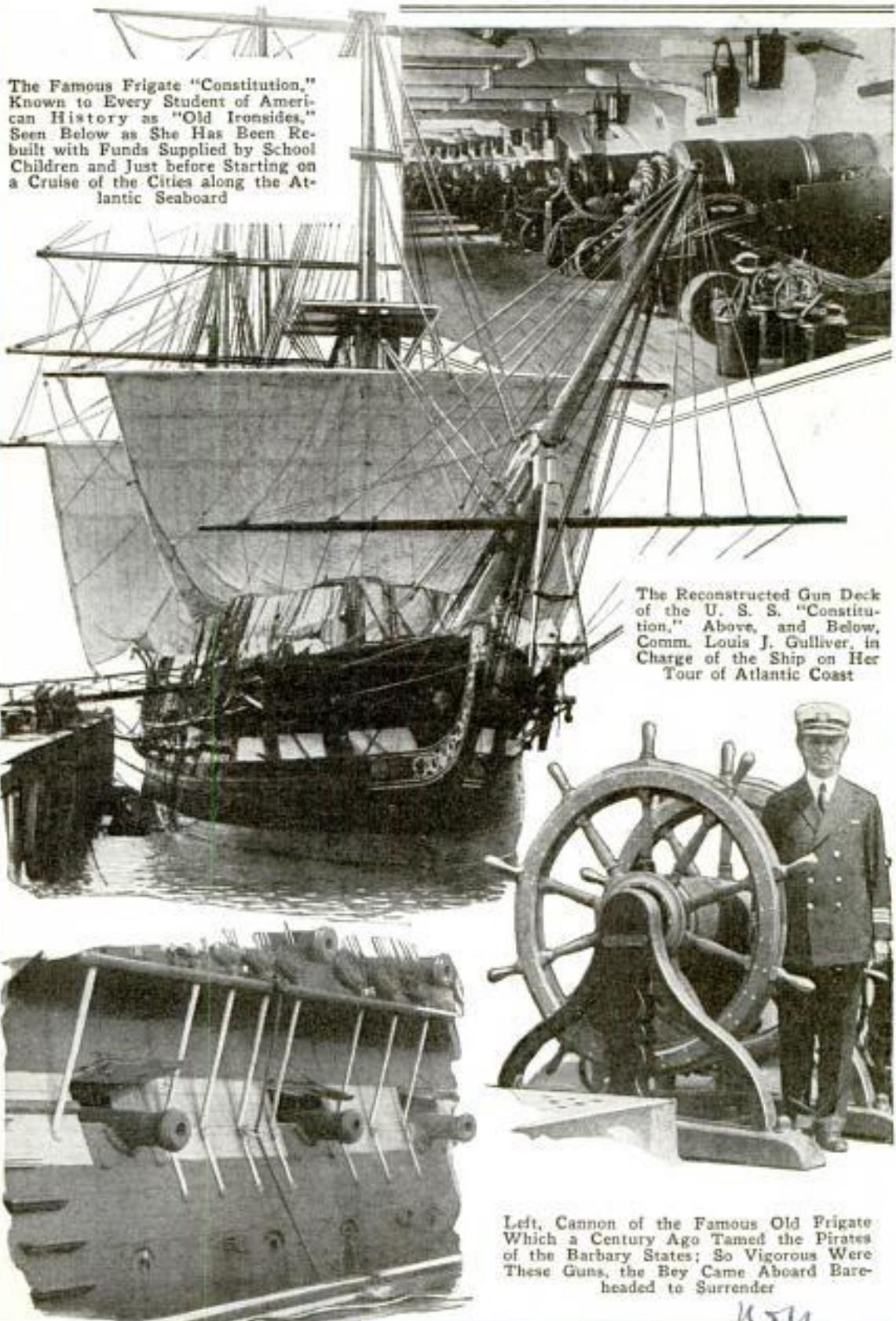
A 1241 SCREWDRIVER TO FIT KEY RING HAS FOUR BLADE SIZES

Carried on the key ring, a pocket screwdriver has recently been introduced with four short blades, each of a different size. It is in the form of a steel disk with the blades spaced around the edge, and pierced with a hole to slip on the key ring. It is about the size of a half dollar and, made to be gripped between the thumb and forefinger, gives a powerful leverage that will move the average screw with ease.

N.Y.U. Products, Inc.
Bldg. Boston Mass.

Dist. Electrovac Corp. Boston
Massachusetts Ave. Boston

"Old Ironsides" Again Rides the Waves



The Famous Frigate "Constitution," Known to Every Student of American History as "Old Ironsides." Seen Below as She Has Been Rebuilt with Funds Supplied by School Children and Just before Starting on a Cruise of the Cities along the Atlantic Seaboard

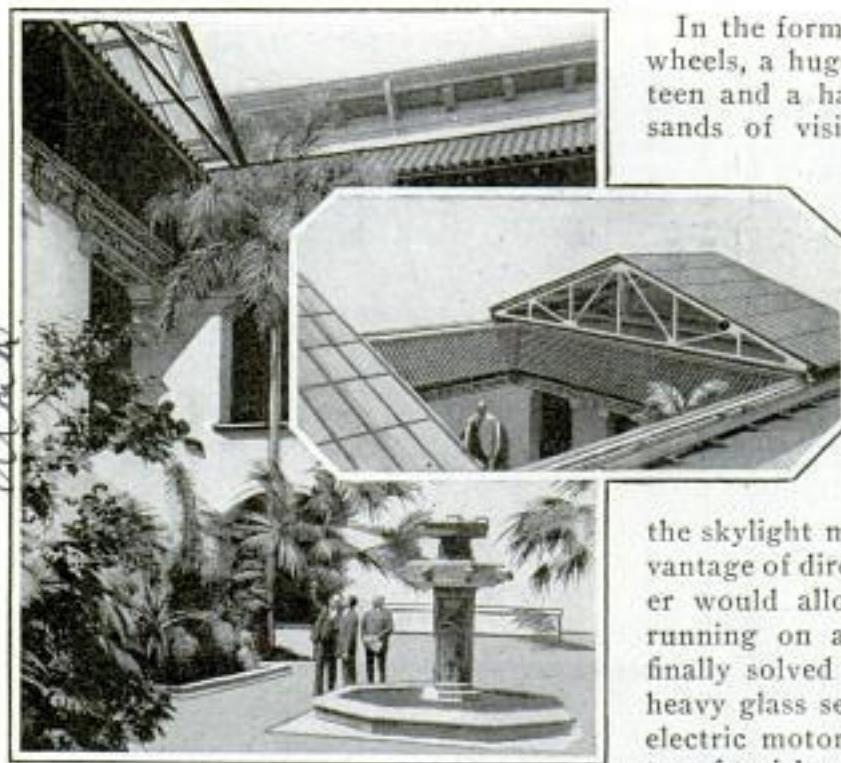
The Reconstructed Gun Deck of the U. S. S. "Constitution." Above, and Below, Comm. Louis J. Gulliver, in Charge of the Ship on Her Tour of Atlantic Coast

Left, Cannon of the Famous Old Frigate Which a Century Ago Tamed the Pirates of the Barbary States; So Vigorous Were These Guns, the Bey Came Aboard Bare-headed to Surrender

July 11 1937
448
Cml. to H. Darcy, 4639 Montgomery St.
Bethesda, Md.

POPULAR MECHANICS

Glass Roof on Wheels Covers Tropic Garden



Tropical Garden Covered by Sliding Skylight, and Inset, How the Roof Rolls on Wheels

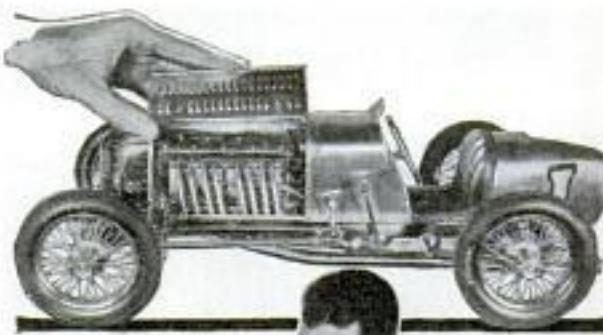
In the form of a mammoth skylight on wheels, a huge glass roof, weighing fourteen and a half tons, is delighting thousands of visitors to the Pan-American building in Washington, D. C. More than 500,000 visit the building annually, and while intrigued by the gigantic ceiling which crowns the patio decorated with 100 varieties of tropical plants and flowers, very few have fathomed its secrets.

It was necessary to make the skylight movable, in order to take advantage of direct sunlight when the weather would allow. Roller-bearing wheels, running on a track seated in the roof, finally solved the problem of moving the heavy glass section without breakage. An electric motor, controlled by a push-button, furnishes the power to slide the movable section slowly open or shut.

TINY RACING CAR WORTH MORE THAN FULL-SIZE AUTO

Plated in gold and silver, a \$10,000 miniature model of the eight-cylinder racing car which won the Indianapolis auto race in 1930, attracted much attention at this year's motor classic. The Lilliputian racer was made by an automobile salesman who spent three and one-half years at the job. It has an eight-cylinder motor that will run, as well as a complete miniature crankshaft, piston and rods, valves and cam shafts, clutch, pinion and ring gear, differential, a four-speed transmission, universal joints, four-wheel brakes, steering gear, magneto, spark plugs, intake and exhaust manifolds and is a front-wheel-drive machine. The car is nineteen and one-half inches long, ten inches wide, five and one-half inches high and weighs fifteen and one-half pounds. The parts are of steel, brass, copper and chrome, with the engine hood silverplated and the wire wheels goldplated. Small photostatic copies of the instrument faces were placed on the dash with a convex lens over each,

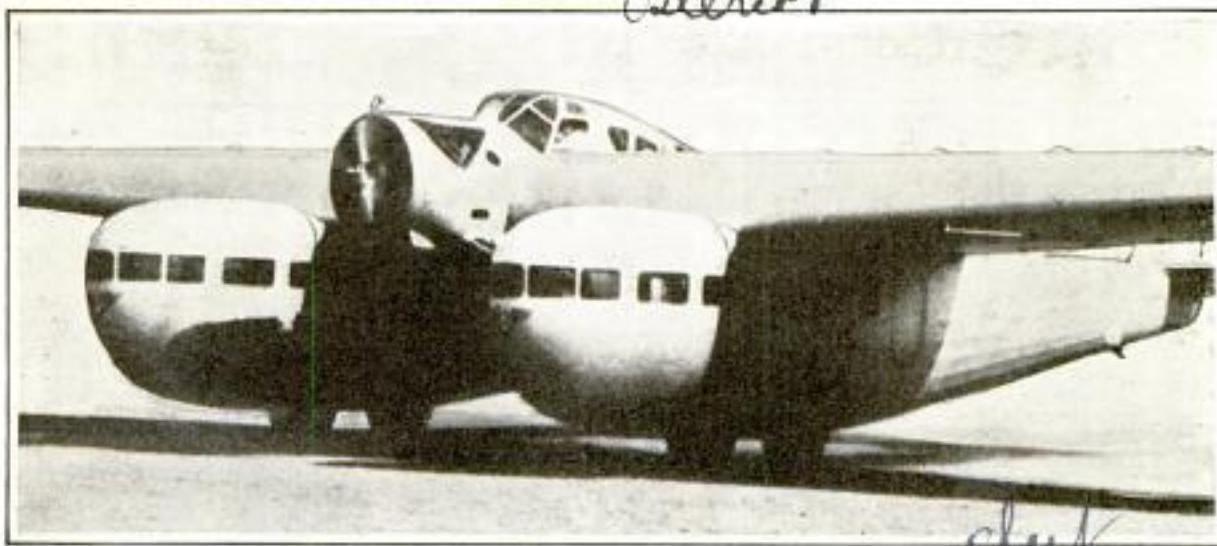
giving a deceiving appearance of reality. The maker used 3,000 screws in the car and spent about \$1,000 building it, as he had to buy all the machinery used in producing the diminutive auto.



Gold and Silver Model of a Racing Car Which Contains Eight-Cylinder Motor That Runs

Cont. Jack Ceynar Apt. 203 2035 3
Meridian St. Copyrighted material
Indianapolis, Ind.

a1228

Bleriot

Transport Plane with Twin Cabins for Passengers and a Landing Gear for Each Compartment; the Pilot's Cabin Is Placed above and between the Double Body of the Ship

AIRPLANE WITH TWIN CABINS CARRIES LARGER LOADS

Appearing like an amphibian with oversize pontoons, a large transport plane with a double body was recently exhibited in France. The craft has two separate compartments for passengers with a landing gear under each, while the pilot's cabin is placed above and between the twin bodies.

a 143

IRON BARS GUARD CAMERAMEN TAKING JUNGLE PICTURES

Motorized iron cages protect six men and a woman engaged in filming sights and sounds of the South African jungles. The party is making a 1,000-mile trip. Motors drive the cages, in which the party travels, close to the fiercest animals, and the pictures are taken in comparative safety. Close-up "shots" are taken with long-range cameras from a distance of 3,000 feet. The outfits are waterproof, and about fifty copies of each sound film can be made while traveling.

BOWLING-BALL SCALE SHOWS WEIGHT AND BALANCE

Bowling balls must be of standard weight and circumference and accurately balanced, and to insure true balls, a scale has been developed for testing them. It has a ring at one end into which the ball fits. The ring shows circumference, and if the ball is balanced by weights, it will

weigh the same as it is turned about in the ring, provided its balance is true. If it is heavier on one side, however, this fact will be revealed. One of the most desirable shots for bowlers is a curve, the ball turning in as it is about to strike the pins. This can be attained by a skillful twist of the wrist in throwing the ball, but a sphere that is off balance will curve even if thrown straight. The scale detects faulty and worn balls and is employed particularly in tournament play.



Testing Bowling Ball in Scale That Measures Its Balance as Well as Its Weight

*expedition headed by
Derr Schomburgk*

*Henry Chapman,
11 Oct 1931
Copyright 1931 Popular Mechanics Co.*

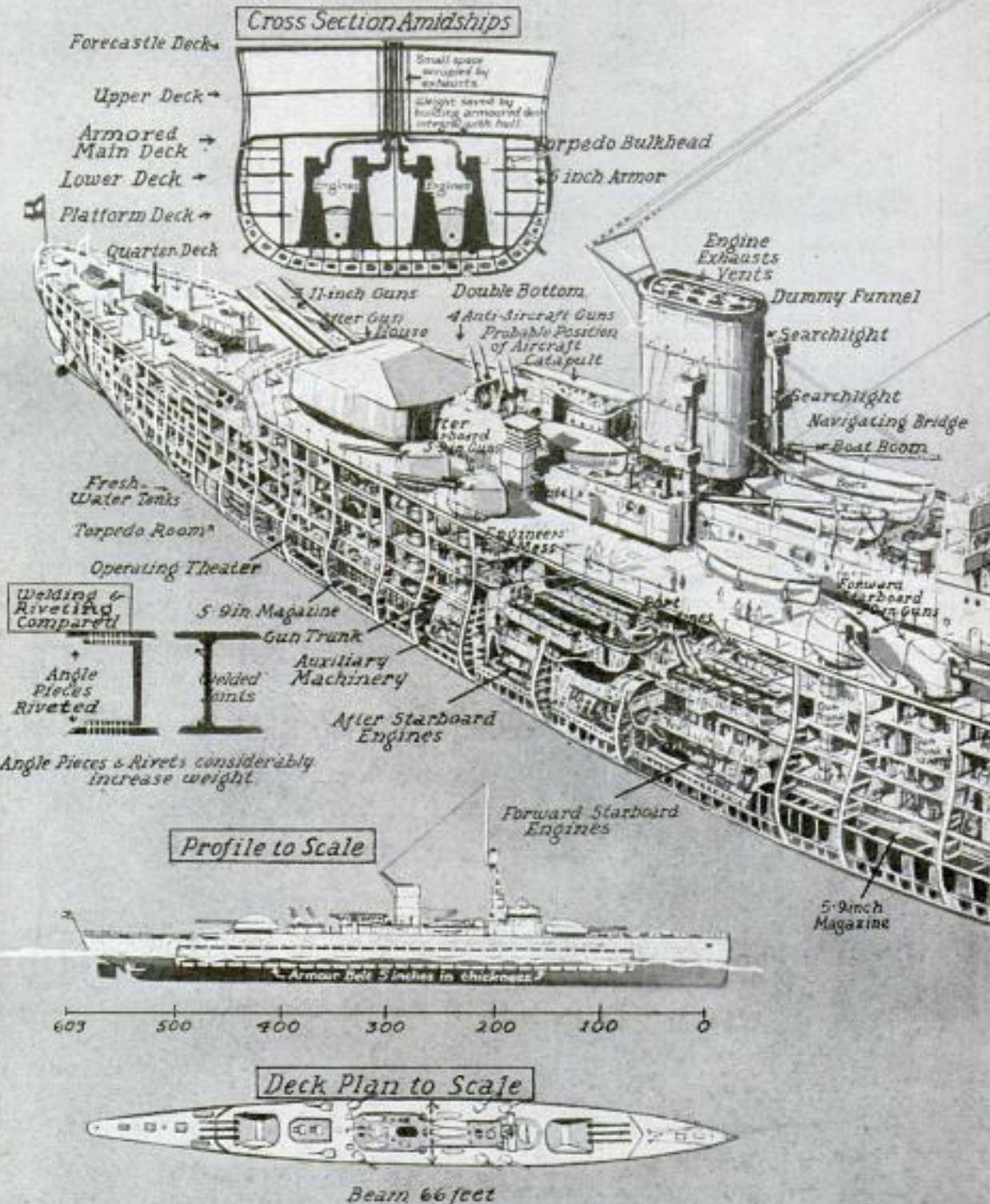
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Illustrated London News
5/30/31 P-920-1

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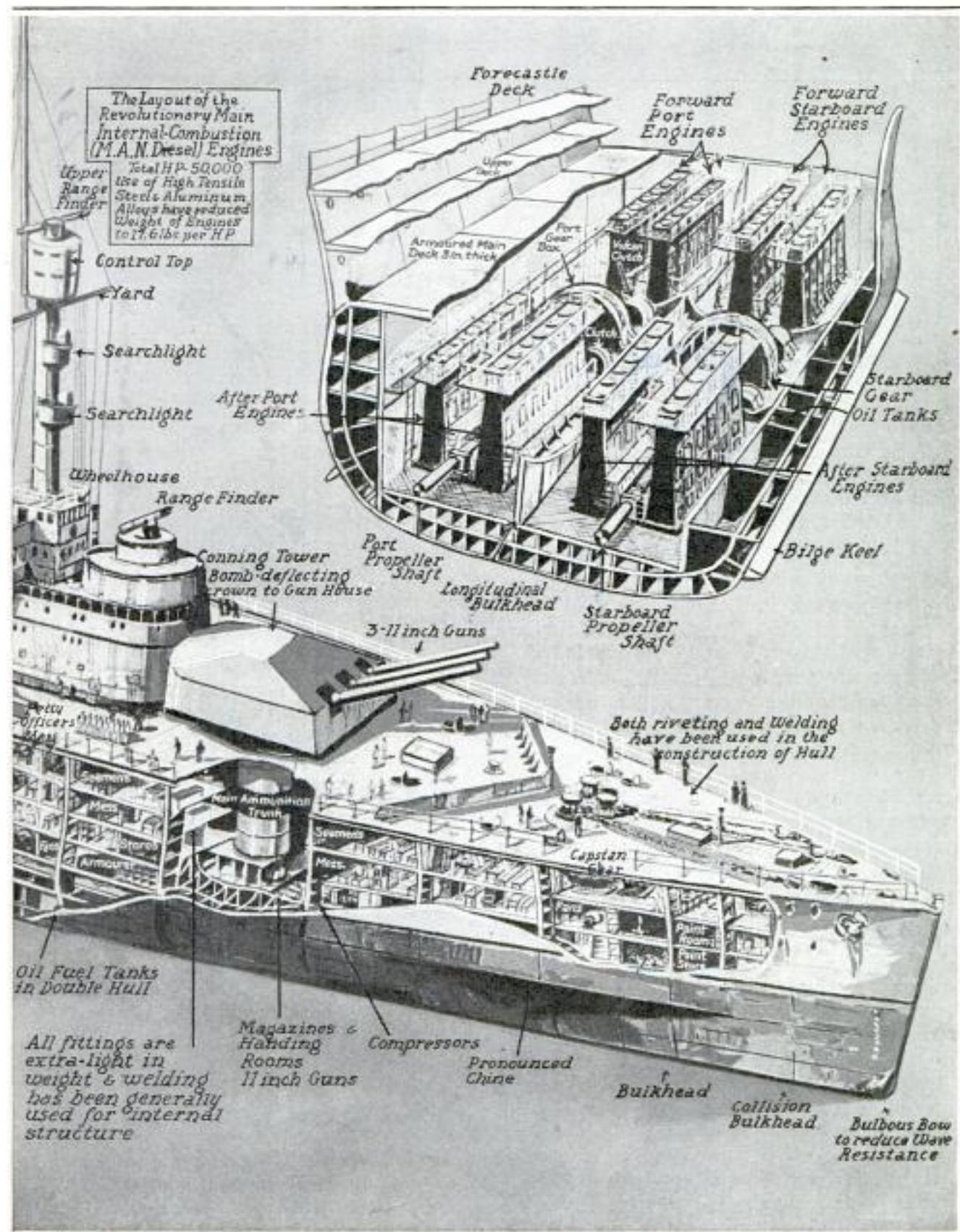
POPULAR MECHANICS

Secrets of Germany's New Pocket Battleship



Drawings of Germany's Newest Fighting Ship, the "Deutschland," Which Combines the Gun Power of a Warship with the Speed of a Cruiser; Welding Was Used to Save Weight

"Deutschland" and Her Wonderful Engines



This "Pocket" Battleship Has Internal-Combustion Engines Delivering 50,000 Horsepower and a Speed of Twenty-Six Knots; She Carries Six Eleven-Inch Guns and Several Smaller Ones

*M. Chartrain
Paris, France*

a1331



© Planet News, Ltd.

Model of Proposed London Airdrome to Be Constructed over Two Railway Stations; Note the Wheel-Shaped Design Suggested by the Architect

AIRPORT OVER LONDON ROOFS SUGGESTED BY MODEL

By constructing an airdrome over the roofs of two London stations, an English architect proposes to connect two passenger carriers, the railroad train and the airplane, and to provide a landing for air passengers in the heart of London. The architect has built a model airdrome in the form of a wheel or merry-go-round, with runways extending in eight directions to the rim of the wheel. The airdrome is planned to rest on supports erected around the two stations, King's Cross and St. Pancras, and under the runways and rim.

UNIVERSE BUBBLE MAY SHRINK *a14 23* VIEW OF EINSTEIN

Our universe is like a giant bubble steadily increasing in size at present, but likely at some time to cease expanding and enter a long period of shrinkage. This is the view of Prof. Albert Einstein as expressed recently in an address. Professor Einstein termed the modern approach to problems of matter and space "a new kind of mysticism which expresses itself in differential calculus instead of pictures." For a time the theory of the distribution of matter in space was that space was empty except for the crowded Milky Way. Later, he pointed out, sci-

ence had to admit that distant nebular wisps really were systems as big as the Milky Way. According to Newtonian astronomy, however, such a universe would be lopsided and could not maintain its equilibrium.

UNSINKABLE LINER IS SUCCESSFUL *a144* IN TESTS

French naval engineers recently witnessed successful tests of a ship model described by the inventor as "unsinkable." The model, a diminutive ocean liner, has a hull of thin plate. It was rolled

to an angle of forty-five degrees and holes were driven below the water line, but the craft only floated a half inch lower in the water. Three men stood on the boat until it was almost submerged, but when they leaped off, it righted itself and came up pouring water from every orifice. The inventor offered to cut the model in two to demonstrate that each end would continue afloat, but the engineers expressed themselves as satisfied.

SELF-ADJUSTING BOTTLE CORK USED FOR RECAPPING

a1276

Fitting the necks of bottles from three-quarters of an inch to one inch in diameter, a self-adjusting stopper is found particularly useful in recapping tomato sauce, ammonia or cordials. The jaws of the stopper clamp over the neck and if any gases form, it automatically seals tighter.

Scientists are seeking a cheap and durable cup for gathering turpentine gum.

*Herald Examiner Thomas Dale May 6
6/27/31 24 Berlin Worcester, Mass*

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Oakland County Q1262

STOP SIGN FOR OFFICER'S CAR
MADE FROM FLOODLIGHT

To inform motorists that they are being hailed by officers, deputy sheriffs in Michigan have made stop signals out of floodlights used in backing up, and employ them in halting cars at night. The sign is made by painting the lens a bright red and pasting on the inside the word "stop" in large letters, with the designation of the proper law-enforcing agency above and below it. The light is mounted on the right side of the officer's car. Previously exhaust whistles were used by officers to stop autos, but many drivers mistook the warning for a threat of a holdup and attempted to speed away.

GIANT CORKSCREW DIGS HOLES
AND PULLS OLD POSTS

A huge auger is in use in a California city to dig holes for electric-light posts. It is mounted on a truck, and in the assembly is included a derrick that pulls out the old posts. The giant corkscrew will dig a hole from six to nine feet deep in seven minutes, and allows a crew of two men to take out seventy old and install the same number of new posts in a day, where it formerly took eight men a day to remove and install an average of only eight posts.



Giant Corkscrew That Pulls Old Posts and Digs Holes for the New Ones

Used by Los Angeles
Loyola Electric Corp.,
Los Angeles, Calif.



"Lion" Being Lowered in a Manhole to Draw a Brush through the Drain to the Next One

DOG TRAINED TO CLEAN DRAINS
IS GIVEN A DIPLOMA

"Lion," a French dog, so named because of his strength, is a great help to those whose job it is to clean the city's drains. A light cable is attached to the dog's collar and he is let down a manhole. He scampers through the drain and is pulled out at the next manhole. Attached to the cable is a huge brush which cleans the drain as the canine runs through. He recently was awarded a diploma for his work at the canine exposition in Nice.

Banworts Park
SMOKE INDICATOR FOR AIRPORT
REPLACES WIND SOCK

Installed on an airport near London, a wind indicator that shows direction of the currents on any part of the field has been developed. "Smoke pots" burning low-grade oil are sunk into the airport floor at central points where the planes land, instead of at one side as in the case of the wind sock. The smoke streams through a hole in the top of a concrete chamber, covered with steel flaps strong enough to bear the weight of any plane landing on the field.

Mr. Mr. Ahrens, Deerman
scientist. Copyrighted material



a1264
A Talking Scarecrow That Has the Birds Bluffed; a Loud Speaker Is Concealed Inside the Coat and Connected to the Radio in the Home of the Farmer Who Built It

SCARECROW TALKS AND SINGS TO FRIGHTEN PESTS

Given a voice in the affairs of its owner, a scarecrow on a farm near Portland, Ore., has succeeded in doing the thing most scarecrows are made for and seldom accomplish—scare crows. A loud speaker has been rigged inside the gentleman's coat, and connected to the radio in the farmer's home. The crows have kept far away from the berry patch since the introduction of the musical effigy.

SOUND AND ECHO MADE VISIBLE BY EXTRA-FAST CAMERA

a1454
Sound and its echo are made visible by a Japanese camera which takes pictures at the rate of 40,000 a second. On the screen the sound is like a moving shadow, behaving much like the waves that come from dropping a pebble into the water. The sound is produced in an oily liquid in a glass container. When the sound waves reach the edge of the glass, they rebound, resulting in actual pictures of

the echo. One picture shows the phenomenon of the whisper, which, when breathed at the right spot in an auditorium, can be heard at a certain place on the other side, but nowhere in between.

SHELLED PEANUTS ARE HEATED IN SLOT VENDER

a1278
"Toasted" peanuts are sold in a slot machine just placed on the market. A red lamp fitted on top flashes intermittently to draw attention, and when a coin is placed in the slot, a quantity of peanuts is dropped into the heating chamber and delivered warm and crisp. The peanuts in the storage jar will not turn rancid.



berry farm of Mr. Johnson

a1454

*Designed by Barini
Shiba, Japanese Imperial
Institute, Tokyo, Japan*

*Roy Stringer & Ltd.
968 21st Avenue, New York
Manufactured by
Electric Mfg. Co., Inc.*

NEW DISCOVERIES ARE THREAT TO DISARMAMENT

a 14 35

Fear that later scientific discoveries may make disarmament agreements invalid before they are fairly ratified has been expressed by Sir Samuel Hoare, president of the British science guild. The scientific aspects of disarmament deserve as much consideration as political and financial angles, he said, and pointed out that science might develop new types of weapons outside the scope of any disarmament agreement based on conditions at any particular time. The main problem lies in finding some method of controlling the future weapons of destruction, for scientists are bound to discover new rays, gases and explosives in the course of their ordinary work. The question to be faced, he said, is whether the world can prevent the use of invention and discovery for the purpose of destruction, for, if anything is certain, it is that any future war will be very different from the last.

BALL GAME PLAYED WITH GUN CALLS FOR FAST ACTION

a 14 400

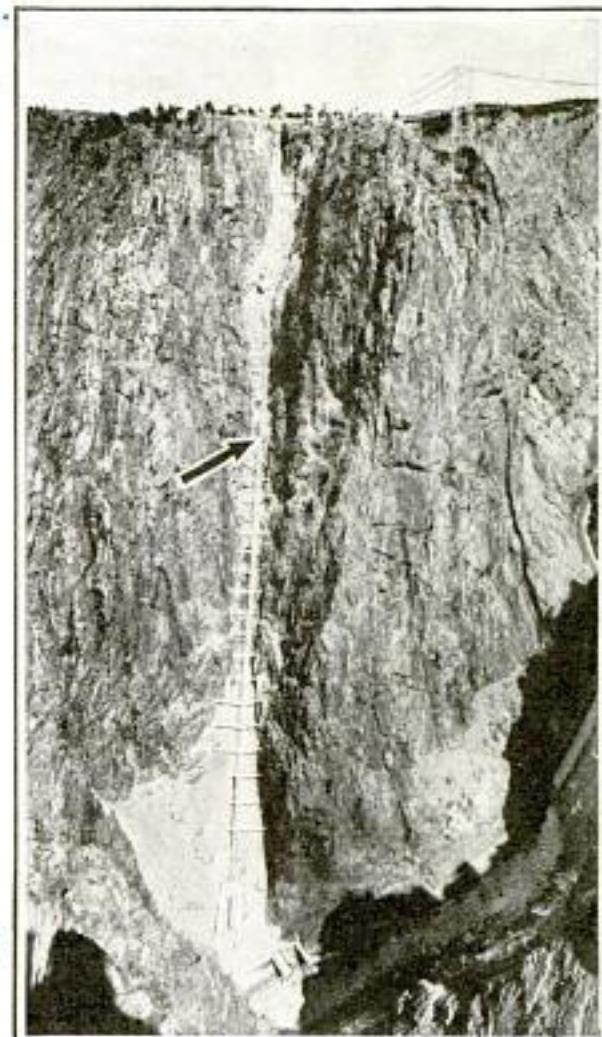
Bang ball, a court game which calls for fast and snappy action, has been introduced for use on the playground, bathing beach and home lawn. It is played indoors or out. The game requires less



Two Bang-Ball Players "Shooting" the Ball through a Hoop on an Outdoor Court

space than many others, and celluloid balls are used for safety. Each player is equipped with a "gun" which is used to shoot the ball through a large hoop on top of a standard about seven feet high.

*The Isabbs Mfg Co
Canton, Ohio.*



View of World's Steepest Railway, Which Is Built up the Side of the Royal Gorge

STEEPEST RAILWAY IN WORLD CLIMBS ROYAL GORGE

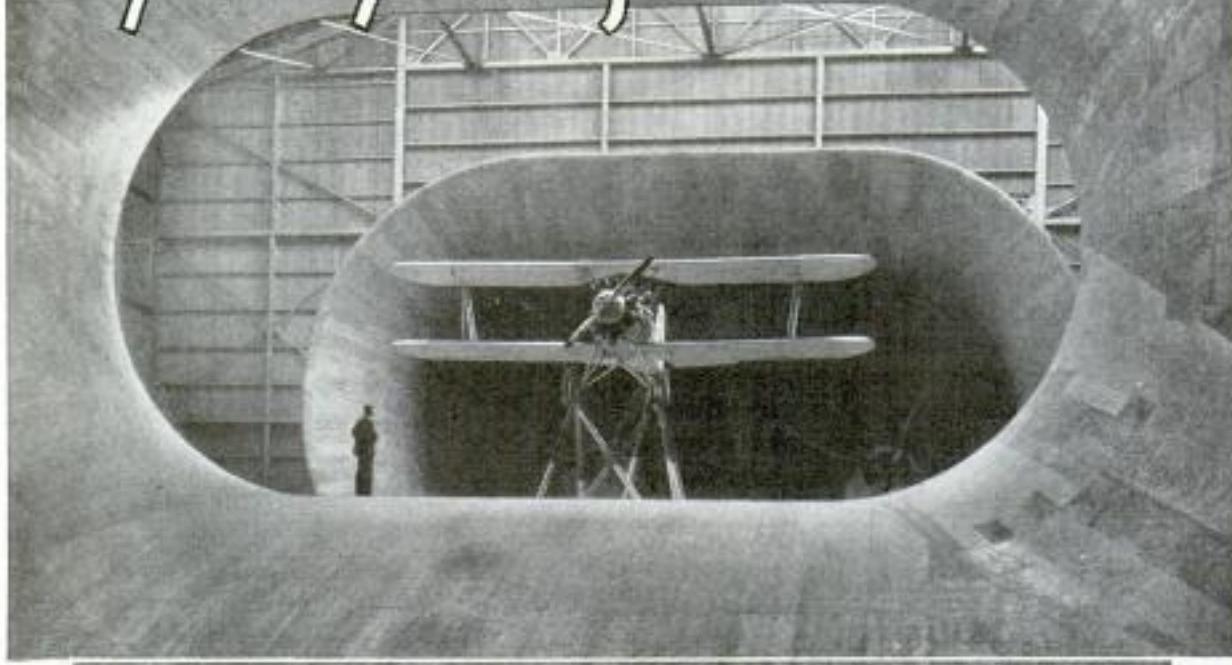
Standing virtually on end, like a giant ladder, the steepest railway in the world is the recently opened electrified road built up the side of the Royal Gorge of Colorado. The line extends 1,725 feet, or more than a quarter of a mile, from the base of the crest of this great wonder of nature and is built on a 100-per-cent grade at an angle of forty-five degrees. Cars are controlled by the latest safety-brake devices, and the line connects with the famous hanging bridge over the gorge, which was another remarkable feat of engineering.

We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

a 1221

Col. G. Corley McFarland
Langley Field
Hampton, Va.

Mystery Engine Promises



This Giant Wind Tunnel Has a Mouth Sixty Feet Wide and Thirty Feet High; a Full-Sized Airplane Is in Position to Be Blown by 100-Mile-an-Hour Wind

FOR years the most brilliant aviation brains of France, England, Germany and America have been working secretly to produce a light engine that would run on furnace oil, thus eliminating the hazard of fire from flying.

Millions have been spent, as motors roared on test benches and engineers peered into wind tunnels, testing, verifying and experimenting. At Langley field, the big Packard laboratory and the Rolls-Royce plant in England the work has gone on.

America has produced several engines and England has announced the perfection of a "mystery engine," which is said to produce more power per pound of weight than any built in the world. A model is declared to have run a full year without missing fire once.

This startling power plant, details of which are not known even in England outside the offices of the government and the research staff, is expected to eliminate all hazards of fire in the air.

It will operate on shale oil, gas oil or any other type of heavy fuel, and even on alcohol if necessary. Where it scores over

any other of its type so far produced, according to meager information that has filtered through the closely guarded factory portals, is in its flexibility of speed ranges, light weight with great power, and in a mysterious detail of design in its injection-pump system.

The engine has been named the "Condor III." While heretofore it has been a difficult matter to run a Diesel-type engine at slow speeds, the new engine will turn over comfortably at about 300 revolutions per minute. Its normal full-power speed is around 1,900 revolutions and its maximum well over 2,000.

One of the most coveted records since man has learned to fly is now held by the Packard aircraft Diesel engine, completed and flown for the first time in September, 1928. This was the first oil-burning engine ever to be used in an airplane. It holds the record for non-refueling endurance flights of eighty-four hours and thirty-three minutes. On May 13, 1929, this engine flew from Detroit to Norfolk, Va., 700 miles, at a total fuel cost of \$4.68.

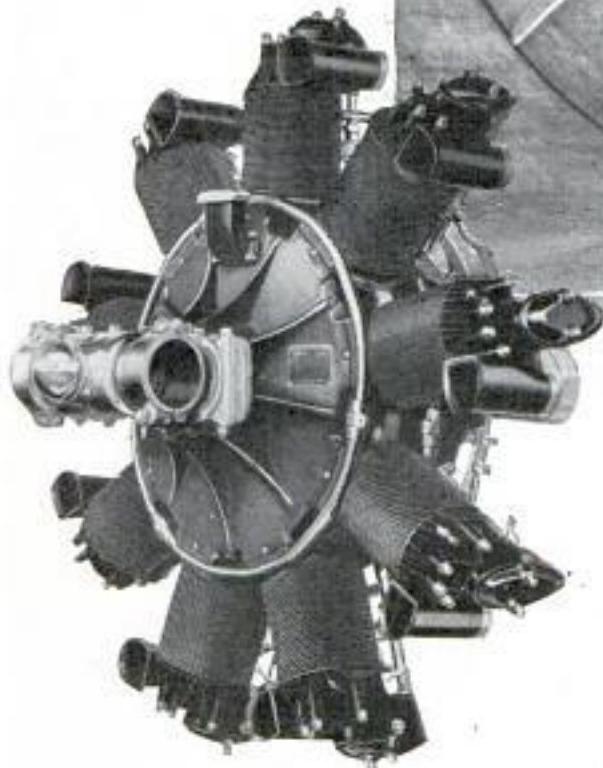
Uncle Sam will test his mystery engines of the future in the world's greatest wind

Packard Motor Car Co.
1580 Grand Blvd.
Detroit, Mich.

Fireproof Flying

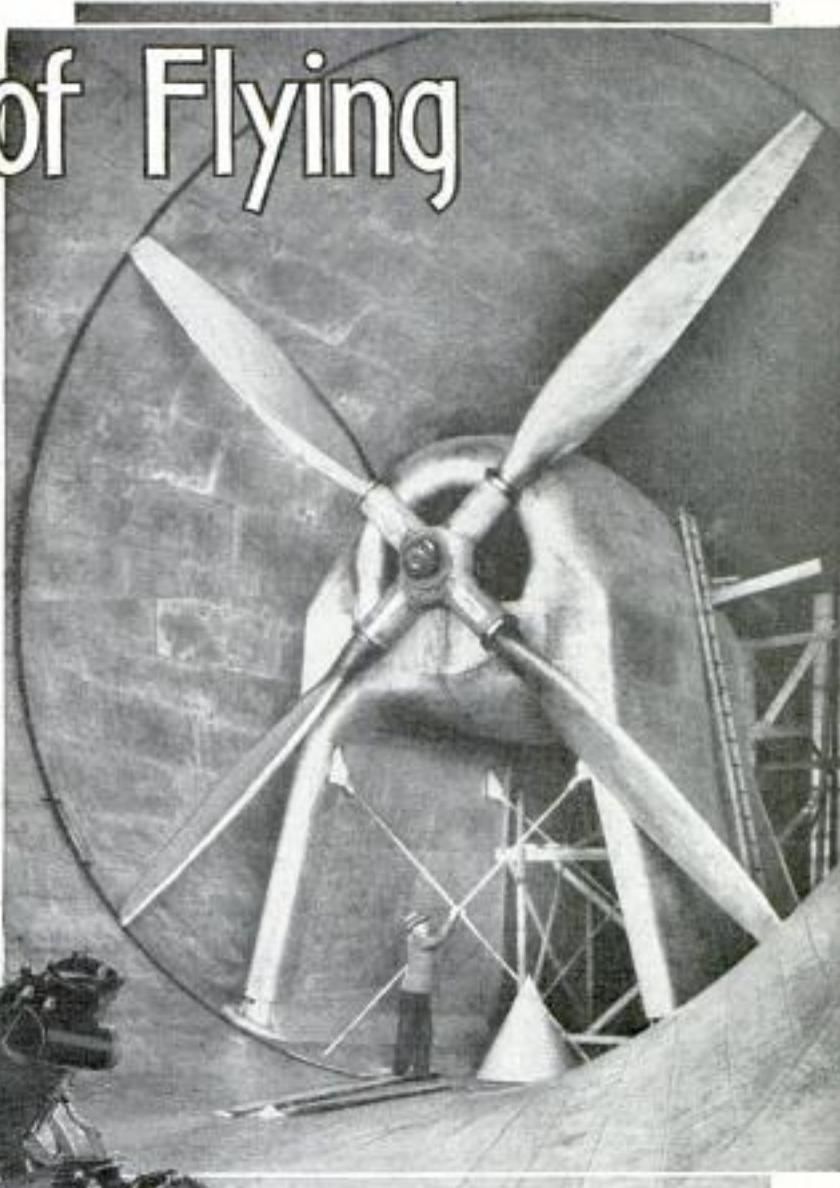
tunnel at Langley field, Va., where somebody recently pushed an electric button and a 100-mile-an-hour gale screamed through the gaping sixty-by-thirty-foot mouth of the tunnel, and struck a full-sized navy airplane hard on the nose.

Opening of the enormous wind tunnel means that at last airplane engineers have a "test block" where their flying wares may be tried out. Tests were hitherto performed on little models.



Giant Propeller That Draws Air through the World's Largest Wind Tunnel, and a Barrel-Valve Diesel Aircraft Engine

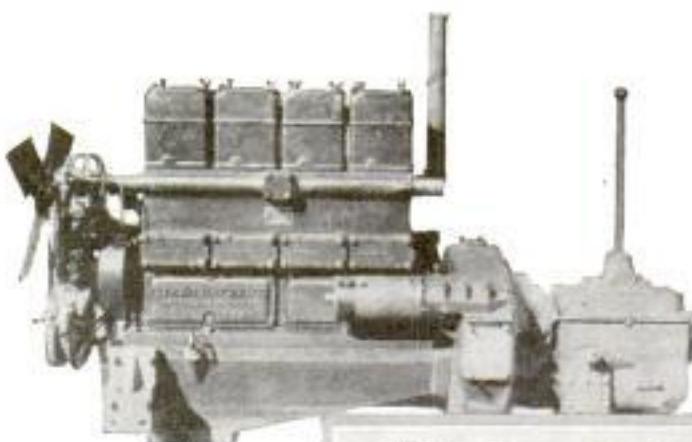
The value of working on full-sized airplanes, instead of models, is not readily appreciated. It would appear that if a principle holds good for a small object, it



should be true with one of larger size. But experience has proved otherwise. A coin and a feather will drop together in a vacuum tube, but in air the feather floats, and the smaller the feather the longer the float. So will big airplanes drop quicker than little models, depending, of course, on the shape of the wings and other peculiarities.

At the time the wind tunnel was opened, the 2,050-foot seaplane channel also was set into operation. The wind tunnel and the seaplane runway will be used in conjunction. The water runway will tell what a full-sized machine will do before it leaves the surface, and the wind tunnel what it will do in the air.

While a wind blast of 100 miles an hour is supposed to be a fair "cruising" speed for the great wind tunnel, it is predicted



the speed can be stepped up to about 150 miles an hour. Speeds such as this will give the pursuit planes a chance to show their fatal wing flutters.

These artificial speeds are produced by huge fans, turned by two 4,000-horsepower motors. And the howl of the wind as it rushes through the vast throat can be heard a mile away.

In the seaplane runway, the pontoons or hull of a full-sized craft can be towed through the water at a speed of fifty miles per hour or more. Two 1,000-horsepower motors do the dragging. An electric frame, operating on the same principle as a street car, with overhead trolley wires, is used for the purpose of pulling the hull or pontoons through the water.

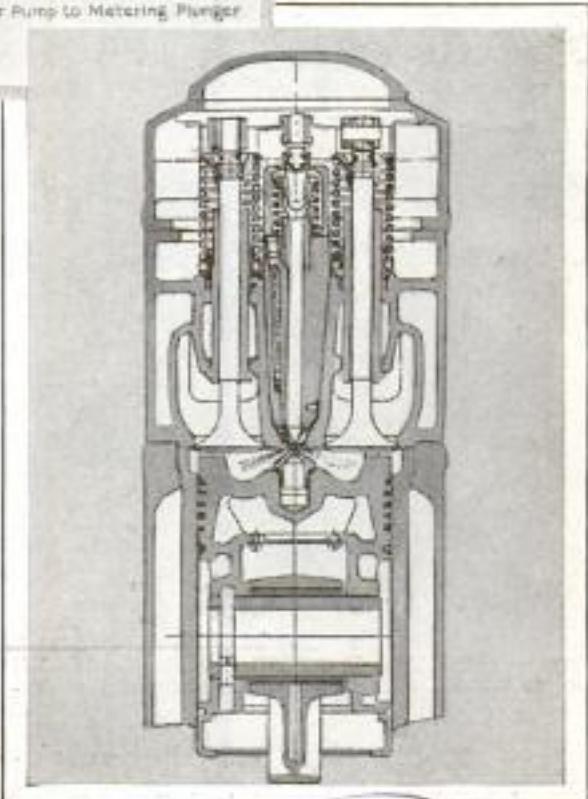
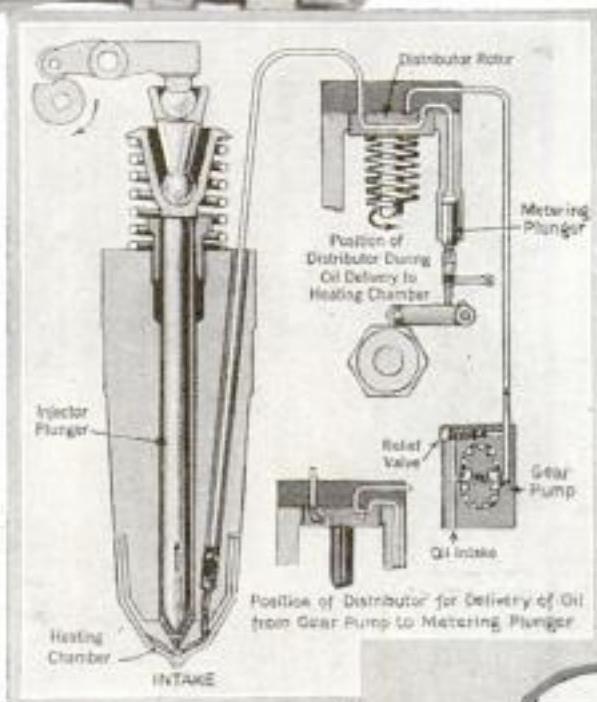
When an airplane is set up for test before the tunnel mouth, it is fixed like a patient about to undergo an operation. But the airplane is chloroformed with recording instruments. Instead of taking the pulse of the airplane, it is watched for such reactions as pressures, pushes, pulls, strains, twists, turns, sags and breakages. After a full-sized airplane has been checked with the full blasts of tunnel breath, it may be taken down, torn apart and the structure of the fuselage, wings, etc., studied with microscope or even X-ray.

A specially built elevator has been provided to put the airplane "on the spot." The plane is pushed upon adjustable props which are strong metal tubes, set to catch the plane beneath the undercarriage and at the tail skid. A button then is pressed, and up goes the machine into position.

It is expected the blast of wind will sometimes blow off tails, ailerons and flippers. This is exactly what the tunnel is for—to test the strength. If pieces fly away in the artificial wind, it means they need strengthening.

This big wind tunnel has cost around a cool million dollars. But nobody can begrudge it for such a test block of safety.

But safety is not the only use the tunnel will be put

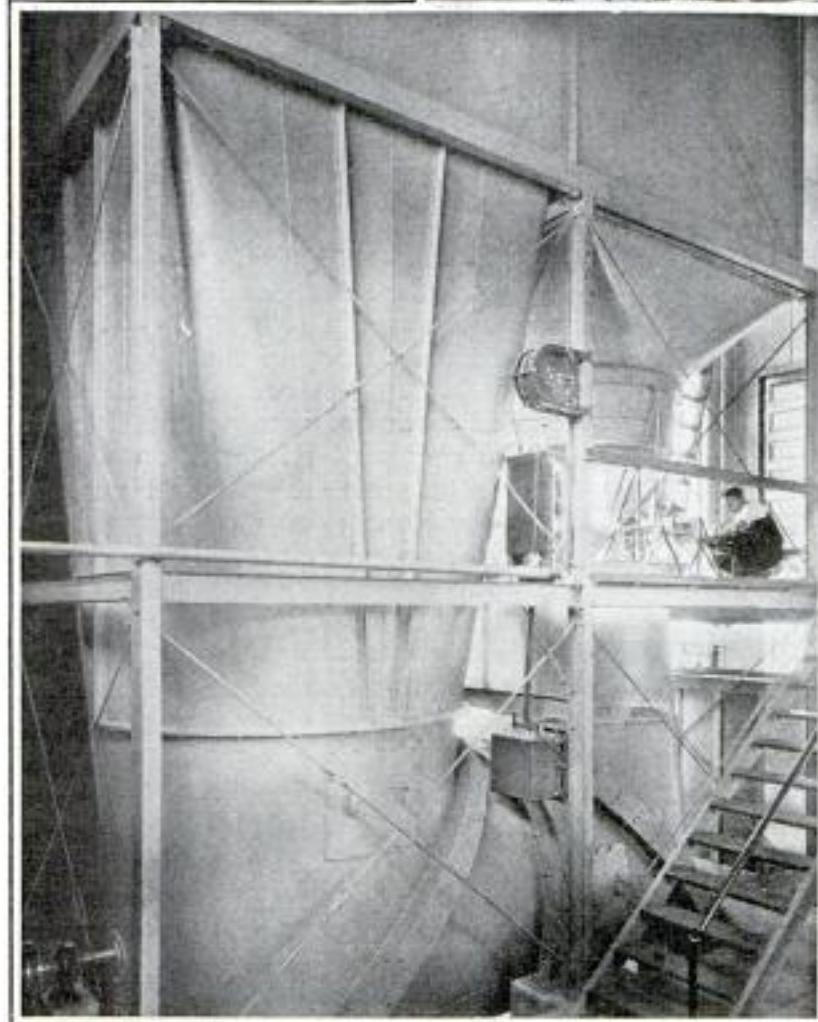
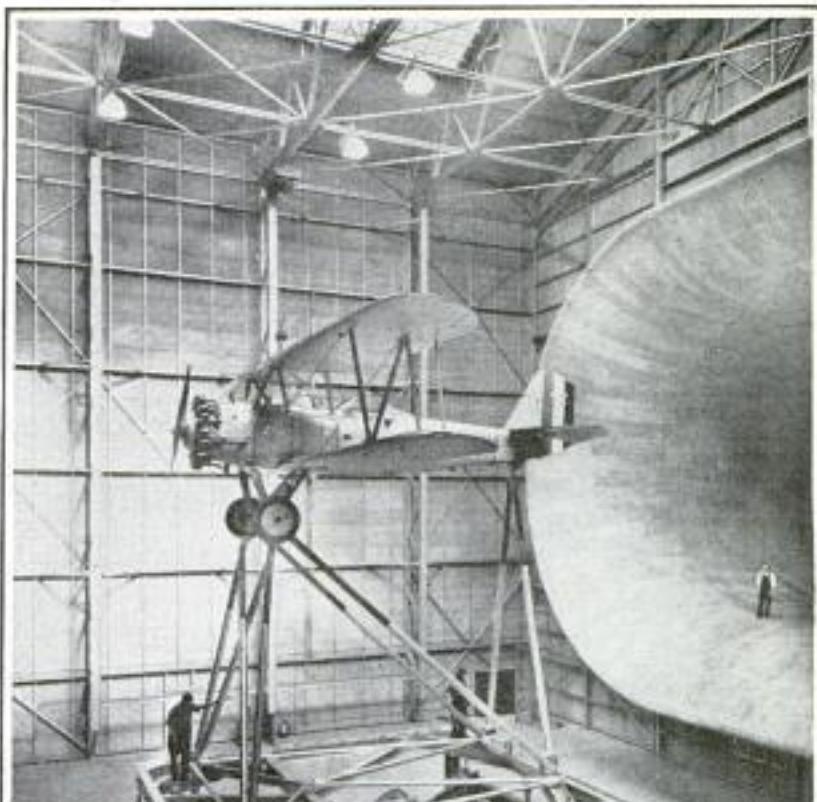


Four-Cylinder Cummins Diesel Engine for Autos, and Drawings of Its Fuel-Injection System

*Cummins Engine Co
Columbus, Ind*

to in studying aircraft. Speed may be studied through tests of different kinds of "fairing" or streamlining. The giant motor stand which holds the biggest four-bladed propeller in the world at the rear of the tunnel, is faired by having all the rough corners shaved down. This stand allows the wind blast to ride over it as the long wide blades of the propeller suck the air through the tunnel throat.

Engines have had to be tested heretofore upon the ground and in air that is comparatively still. Even engines with regular propellers attached do not



Navy Plane "on the Spot" before the Wind Tunnel; Below, the Vertical Tunnel That Tests Spins and "Falling Leaves"

get the same air stream as they do in the air. But by putting them in the mouth of the wind tunnel, regular flying conditions can be set up. The wind rushing past the air intake of carburetors makes a decided difference in performance.

Low operating costs, reduction of fire hazards to the absolute minimum; dependability, as the result of fewer working parts, and the absence of any electrical ignition apparatus that might give trouble in the air or cause radio disturbance, are factors which have brought Diesel-type engines more and more to the consideration of the public.

a1338

Cmt. Herbert Beardsley
Walcott Ave. Newport R.I.

460

POPULAR MECHANICS

Painting the Giant Thrillers of Bygone Ages



Prehistoric giants of the animal kingdom that walked the earth millions of years ago are being reproduced faithfully in models and paintings from studies of fossils of these extinct creatures uncovered in Montana, Indiana and other parts

Paintings of Prehistoric Animals Made from Models Built after a Careful Study of Fossils

of this country. To visualize a diplodocus or dinosaur, it is first necessary to make a precise study of the fossil structure, including the recording of hundreds of measurements. From such a study, a clay model is built up that is accurate to scale, the natural posture and the various details of body structure all being carefully worked out and incorporated in the small model. When this model is considered scientifically exact and correct in every detail so far as present knowledge makes possible, the artist is able to begin work on his painting or mural, using the miniature for a model and producing the scenic background to represent the earth as it appeared at the time the creature lived. Charles R. Knight, one of the foremost painters of prehistoric life, has made a study of animal anatomy in order to enable him to visualize and reproduce with scientific accuracy a picture of some extinct giants whose fossilized bones are the

only evidence that it ever lived. The diplodocus is one example of the creatures thus visualized. Its fossils have been found in Wyoming, and it probably was one of the largest animals that ever trod the earth, being seventy feet long and weighing about twenty tons. It appears a combination of elephant, lizard and giraffe with a small head, supported by a twenty-foot neck, and a thirty-five foot tail that it used in balancing to rear itself thirty feet in the air for browsing on trees. Mastodons and mammoths, somewhat resembling oversize elephants, have likewise been brought to life on canvas.

91294
**FAN-HUMIDIFIER
WASHES AND
COOLS AIR**

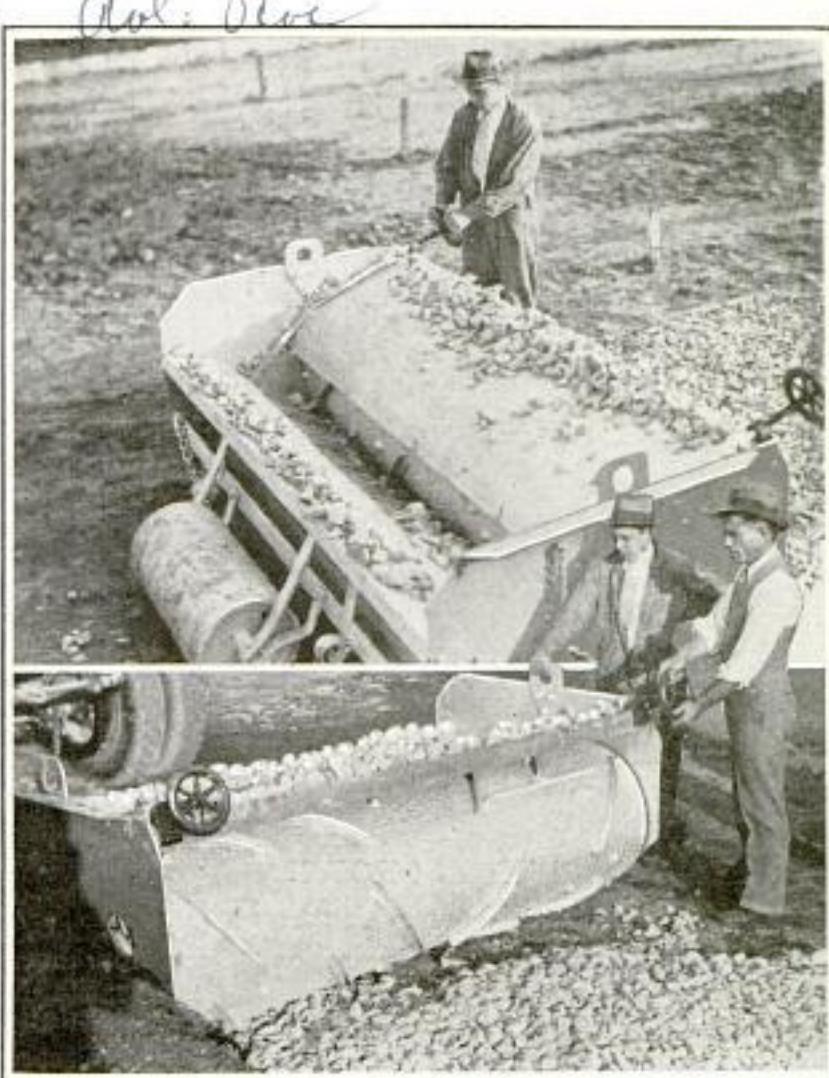
Warm air is washed, cooled and circulated in a room by means of an electric fan which also includes a humidifier.

The air is blown through a very fine spray of water which moistens, cleans and cools it, the cooling being effected by evaporation of the water. The water is lifted from a tank by an endless spiral elevator to a central distributing drum which emits a fine spray as it revolves. A valve adjusts the spray and any excess



aroma. Best results are obtained by placing the fan in an open window and closing openings which admit heated air.

No 188 against him.
Wheat, rye and whole-wheat bread are being produced all in one loaf.



Crushed-Rock Spreader That Lays an Even Depth of Material under the Concrete-Surfaced Road, Thus Preventing "Valleys" and Bumps

**ROCK SPREADER FOR ROADBED
MAKES HIGHWAY EVEN**

Designed to end the chief difficulties of road construction, including particularly the familiar "cup-hollows," a crushed-stone spreader now is available. It is hauled behind a truck of galvanized steel which feeds it. Spiral blades travel along by an outer drum the surface of a cylindrical roller, distributing the rock and flattening it into the tank. A few drops of perfume in the water fills a room with a mild

LAKE HEATS ITS OWN WATER

At a Swiss health resort is a lake which supplies the electric current to keep its waters at a constant temperature of seventy degrees. It is situated at an altitude of 4,000 feet, and the current is generated below its outfall.

*M. Carpenter Baking Co.
Milwaukee Wis.*

AUGUST

FASHION REQUIRES ZOO
TO CLOTHE WOMAN

If all the animals and reptiles that are called on to supply a part of the raiment of modern woman were gathered under one roof, the collection would represent a well-stocked menagerie. To begin with, the felt hat that Dame Fashion decrees may have had its origin in a rabbit, muskrat or beaver. The hair and fur are removed from the skins, separated by a blower and from the fur the hats are made. South America, Canada, Australia and other places supply hat fur. For the fur coat there seems no limit upon the animal range. It may be made from the pelts of lowly rabbits or from the more expensive sable, ermine, leopard or seal. Silkworms supply dress materials, oysters furnish pearls, cloth fabrics may come from the

wool of sheep or the hair of the llama, gloves may once have been the skin of the chamois, some rare deer or the pig, and for shoes the modern miss goes to the reptile house. Snakes, lizards and crocodiles help to supply footwear and the soles represent the hides of cattle that roamed the plains.

Number of
Farm Horses and Motor Vehicles in the U.S.

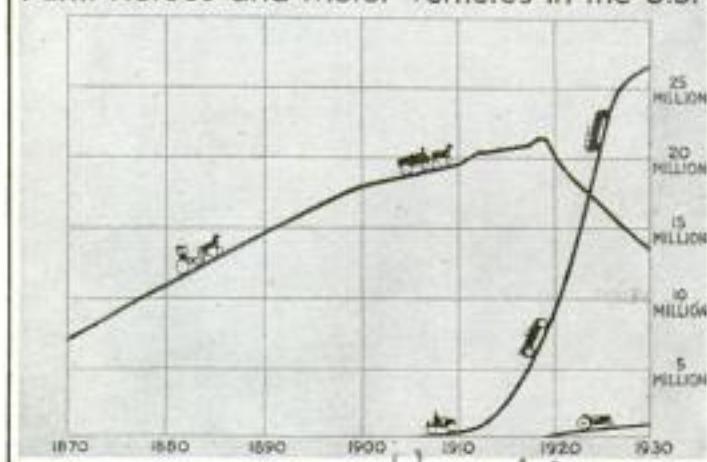


Chart Showing, Above, the Progress of Travel since Horse and Buggy Days, and, Below, How Automobiles Replaced Horses

DRAMA OF SPEED IS SHOWN BY LIGHTS

Striking illustrations of man's progress in his methods of travel are offered in the exhibit of the Museum of Science and Industry in New York, which includes models of every form of conveyance from prehistoric to modern times. One chart demonstrates by means of lights the difference in speed between the horse-and-buggy days and the present. It compares the speed of an airplane, locomotive, automobile, river steamer, horse and buggy and a pedestrian, all starting from Forty-Second street. In one hour, the chart shows the plane at Albany, the train fifty miles away, the auto almost as far, the boat eighteen miles distant, the buggy twelve miles and the man on foot four miles from his starting point. Another chart compares the decline of the horse with the phenomenal rise of the automobile, showing how the number of horses have decreased as the number of motor cars and autos grew in the last two decades.

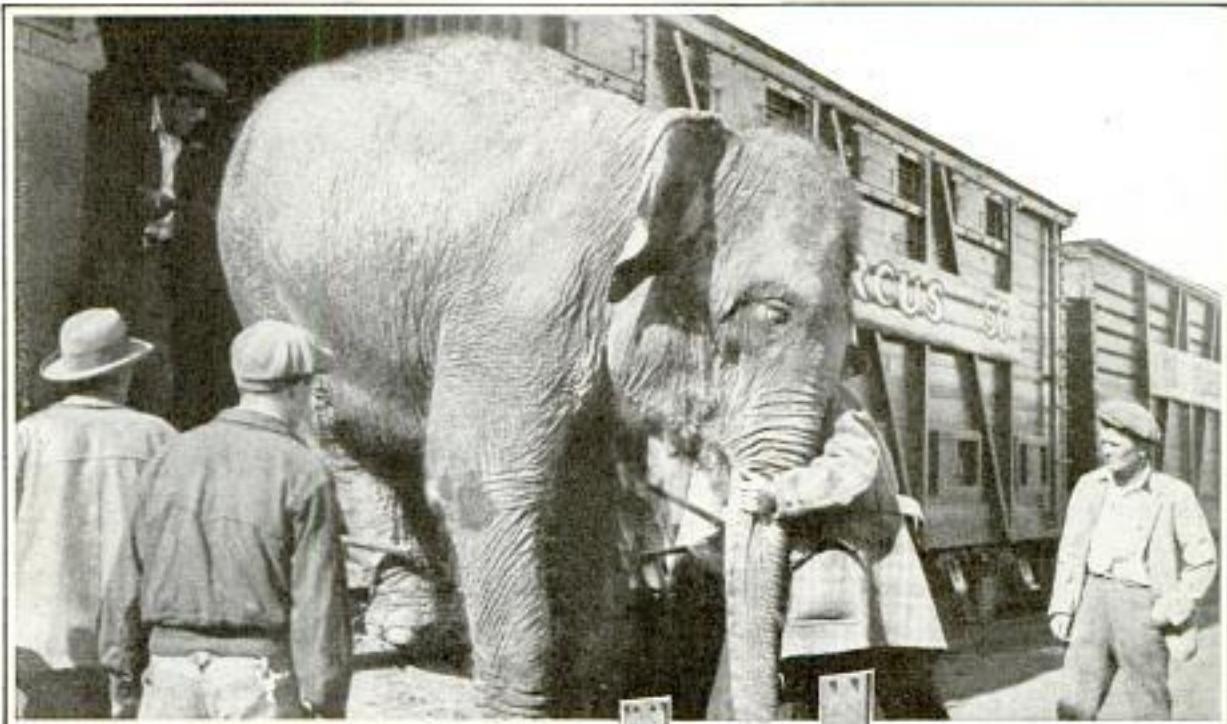


Arnold Eckhardt

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a1280 Cap Curtis, Sells Floto
Circus

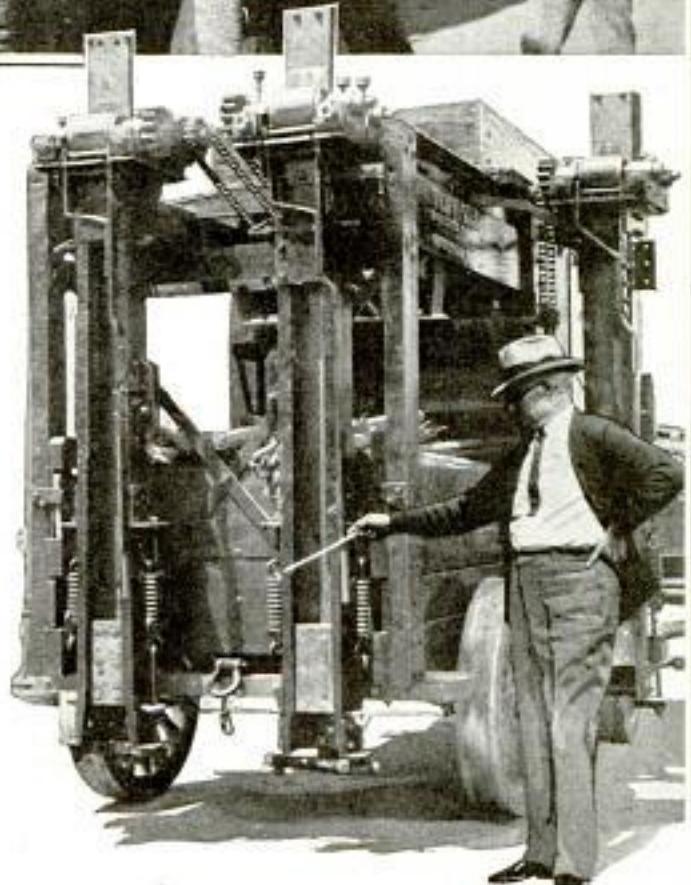
This Inventor Is an Unseen "Star" of the Tanbark and the Big Top



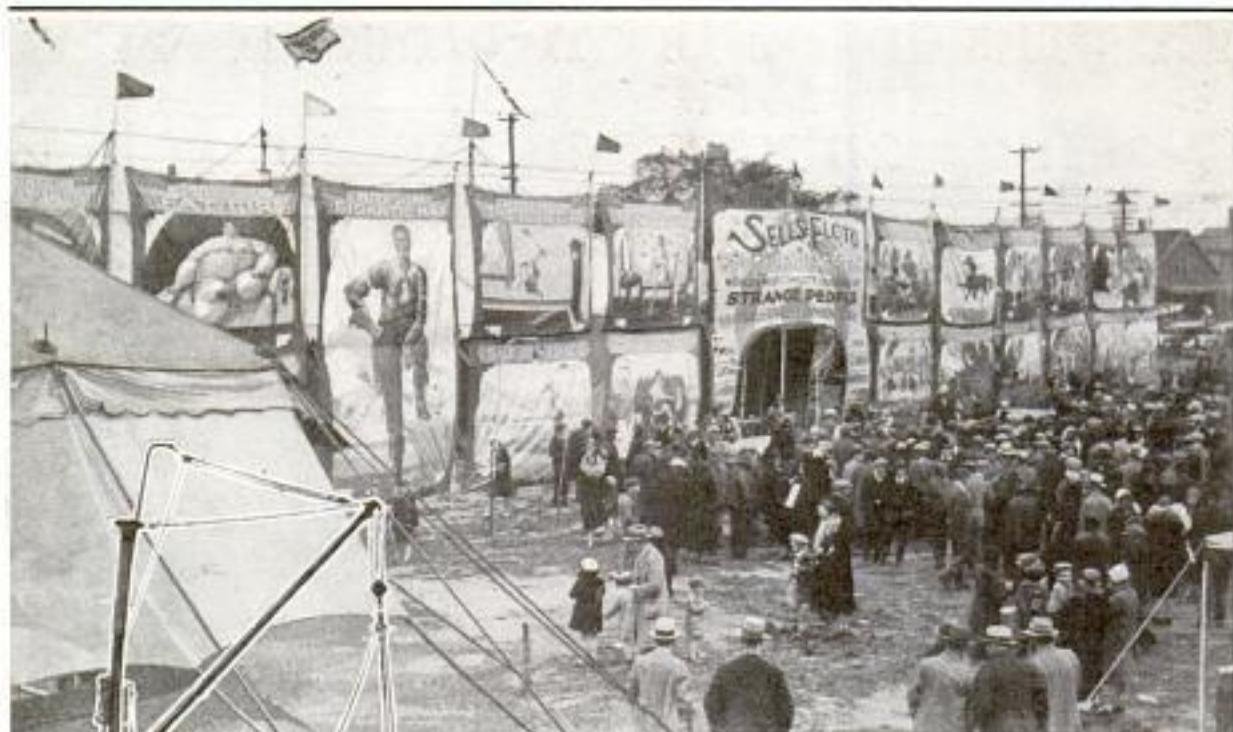
IN ITS mechanical perfection, a large circus is a world unto itself—a world in swift, ceaseless transit.

Time is money to anyone, but to a circus it is existence itself. The advance crews are kept three weeks ahead of the show, "spreading paper" to herald the coming of the "Big Top."

A man who has invented perhaps a dozen time and labor-saving mechanical contrivances is therefore as much a circus star as any billed performer. Such a man, and the only one, is William H. Curtis, known in the realm of canvas and calliope as "Cap" or "Bill." His crowning invention is the triple-stake driver, a most advantageous improvement over the single-stake driver he devised about fifteen years ago. Other inventions of his are: loader crane to hoist bulky canvas rolls into wagons; chain system of circus seats by which bleacher seats can be set



"Fanny" Objects to Loading, One of the Many Delays a Circus Train Suffers; Below, Triple-Stake Driver That Circles the Big Top in Fifty-Four Minutes



Throwing Up the Banner Line to Draw the Crowd; Below, the Canvas Loader That Speeds Up the Departure

up on pavement without use of stakes; a canvas-carrying spool to facilitate rolling and handling of canvas; a guy-rope tightener and several other smaller articles.

Cap Curtis has been a real trouper for forty-one years. As a boss canvas man, he has fought the elements—wind, flood, snow, mud and temperature extremes. The night a troop train plowed through the rear coaches of the Hagenbeck-Wallace circus train, Cap was knocked from his berth unconscious and rode on through the wreck on the pilot of the engine. The next season, he was limping about the circus lots as usual, and he is still at it.

Circuses used to travel in from three to ten railway cars, and, of course, some smaller ones do still, but the big shows have merged and remerged until they have reached dimensions P. T. Barnum never dreamed of. The biggest show in

America needs ninety cars, has about 600 horses, and even more humans. Besides the big top, there are the sideshow, menagerie, dining, dressing, horse and a dozen midway tents to set up and take down each day.

A circus closes its night performance between ten and eleven o'clock. By that time, the first section is loaded with the cook

house, ticket wagons, parts of the menagerie and the properties used in the first part of the program. It gets the "high-ball" and moves away. Perhaps three hours later, the second section begins the jump of from fifty to a hundred miles. The spectre of delay because of breakdown, wreck, flood, storm or any one of many other causes always harasses the circus manager. A recalcitrant elephant may hold up loading for hours, and the big shows have as many as twenty bulls.

Several hours later, the cook house goes up on the new lot, and breakfast is served all too early. The lot superintendent lays out the ground and turns it over to the boss canvas man. He has assistants for the menagerie and sideshow tops. There is rush, but no confusion. Then come the parade, the afternoon and evening performances, and the whirlwind is renewed.

Cmt. & Is. Moore, 3767
Oliver St. N.W., Washington, D.C.

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POPULAR MECHANICS

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465

**CHEMICAL FROM APPLE PEELS
USED FOR WATERPROOFING**

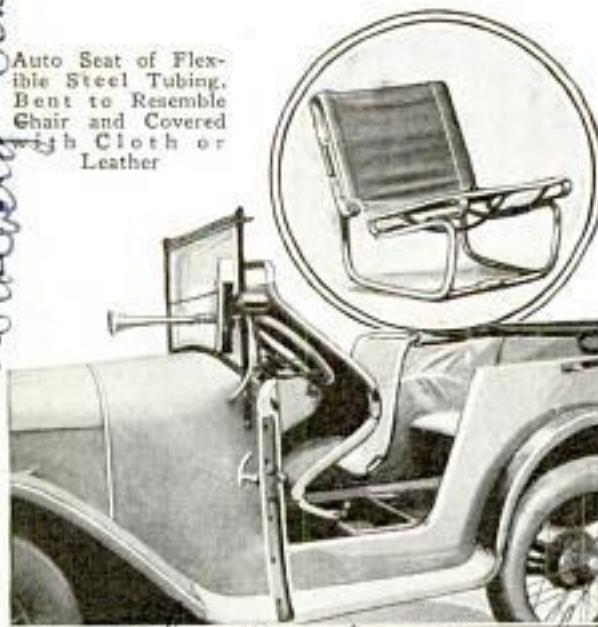
Millions of pounds of apple pomace may be reclaimed from cider and vinegar mills and converted into ursolic acid, a valuable new chemical recently extracted from apple peelings by the department of agriculture. This chemical is a yellow powder in its pure state and repels water. When added to lacquers, it increases their gloss and water resistance. It is being investigated as a possible waterproofing for fabrics and wood. The chemical is contained in the waxlike coating found on apples stored for some time.

Bureau of Chemistry 9/09

**STEEL-TUBE AUTO SEAT
ADDS EASE TO DRIVING**

Adapting the steel-tube chair of modernistic furniture, German automobile manufacturers are equipping their cars with seats made with bent steel-tube frames and cloth or leather stretchers. The advantages claimed for these seats are lightness, comfort, economy, cleanliness and long life. When the front seats of a close-coupled car are of steel tubing, foot room for passengers in the back is increased. The frame is usually a single piece bent to the required shape. In some cases steel springs are added and the fabric of seat and back attached to them.

Auto Seat of Flexible Steel Tubing,
Bent to Resemble Chair and Covered
with Cloth or Leather



Mücke-Heldner Works
Moravská-Ostrava
Czechoslovakia



**MATTRESS FLOAT MAKES BOAT
OUT OF AUXILIARY BED**

Automobiles, bicycles and other vehicles have been converted into watercraft, and now comes the bed that is also a boat. It is an inflated mattress that makes an air raft for surf-riding, boat-trailing and other forms of water sport. When taken from the water, it dries quickly and then can be used for an auxiliary bed, or for lounging, as it provides a full body-length cushion for chair, canoe or porch. It folds when deflated and has large eyelets for attaching handhold ropes.

91354

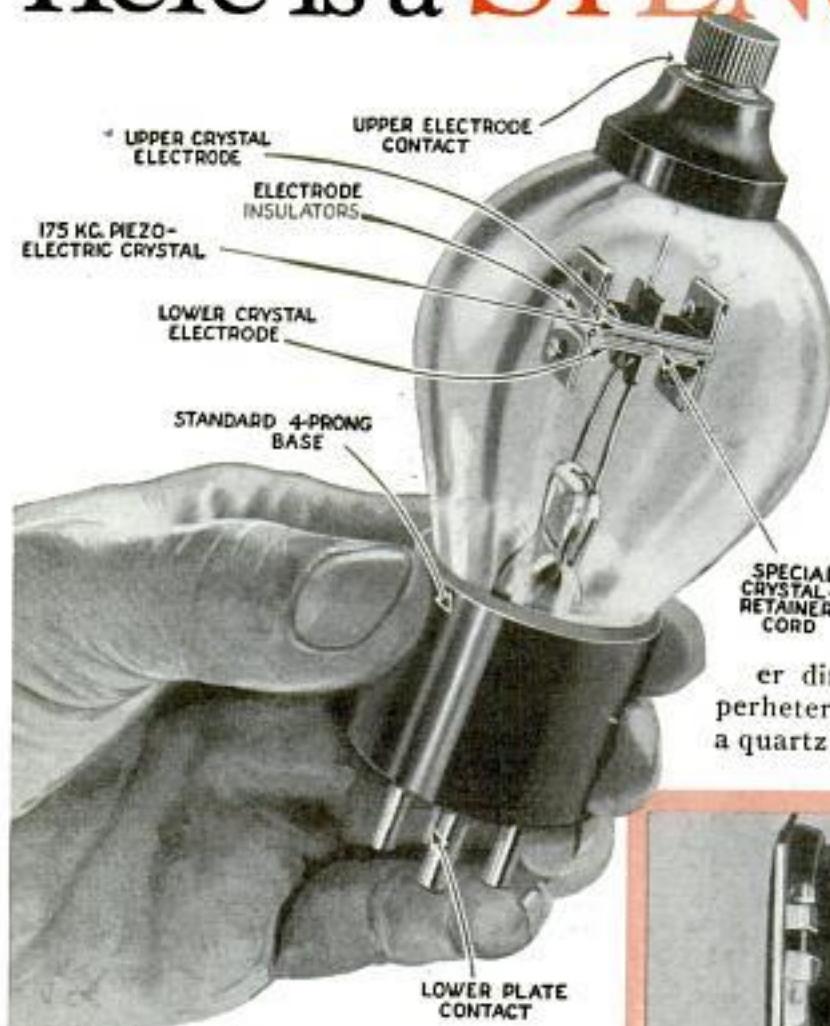
**WHAT IS DIFFERENCE BETWEEN
STRENGTH AND STIFFNESS?**

Stiffness of a material often is confused with strength. Tests on steel rails, for instance, show that in the case of the new 152-pound rail adopted by an eastern railroad, the addition of twenty-two pounds in weight increased the stiffness of the rail seventy-five per cent but its breaking strength only forty per cent.

There were 248,448 motorboats registered in the United States on January 1, an increase of nearly 7,500 for the year.

J. J. Loree, D + H R.R.
Albany, N.Y.
Copyrighted Material

Here is a STENOTUBE



By BERYL B. BRYANT

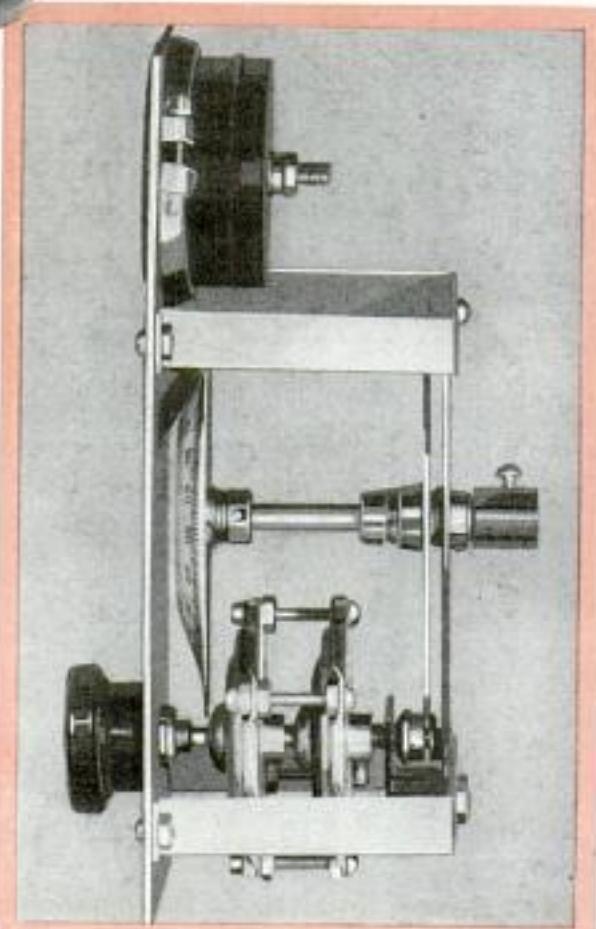
A NEW order of selectivity has arrived when it is possible to tune between two high-powered stations, separated by 10 kilocycles, to a point of complete silence without retarding the volume control. Dr. James Robinson's quartz-crystal superheterodyne, recently introduced in this country by Arthur H. Lynch, not only makes this selectivity possible but has other equally remarkable features not found in modern receivers.

Using American apparatus and general circuit practices, with the addition of the "Stenotube" device, any radio experimenter can assemble this receiver and prove these claims to his own satisfaction. Anyone who has tuned a modern radio receiver to full sensitivity, to pick up distant stations, knows that

the background noise or static makes these stations hardly worth listening to. The receiver offers distant reception without background noises and may be instantly adjusted to eliminate heterodyne interference between stations.

Operating into a standard audio amplifier and dynamic speaker, this receiver will give as perfect reproduction, at both ends of the scale, as any modern receiver.

The Stenotube receiver differs from the standard superheterodyne chiefly in the use of a quartz crystal between the first de-

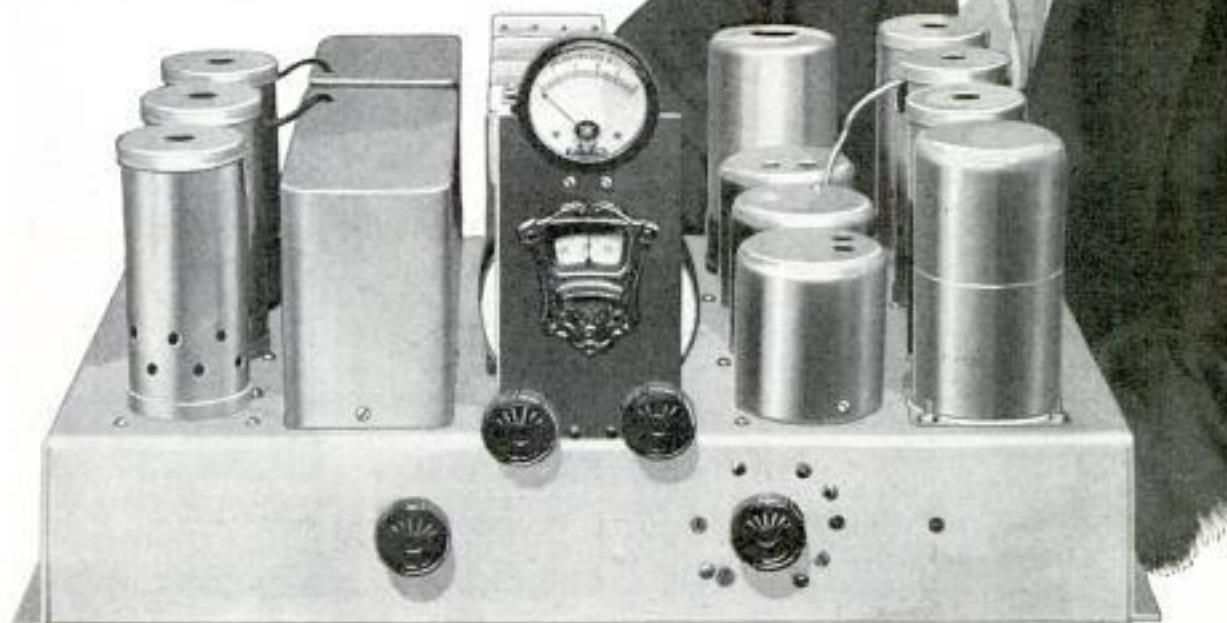


Planetary Dial for Stenotube Receiver Provides Two Speeds, Both Ratios Controlled by the Single Knob

Set for You

*Latest Radio Development
Gives Perfect Tone and
Complete Selectivity With
No Background Noises*

tector and the intermediate-frequency amplifier. The crystal vibrates between two metal plates and is housed in a tube mounted on a standard UX-base. Signal frequencies close to, or identical with, the natural frequency of the crystal pass



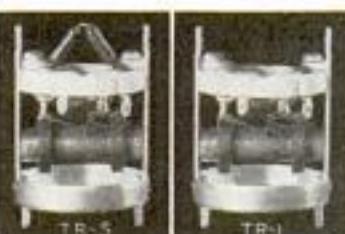
through it to the intermediate amplifier, while others are barred. The crystal is operated in a bridge circuit, as the two plates of the crystal mounting form an unwanted capacity. One arm of the bridge is a three-plate midget condenser known as a "Stenodon." When properly adjusted, this condenser prevents the undesired signals from using the capacity of the crystal holder as a path, while the station signal passes through the oscillating crystal to the intermediate amplifier without opposition.

The special tuning dial developed for this receiver is shown in the photo on page 466. A planetary form of transmis-

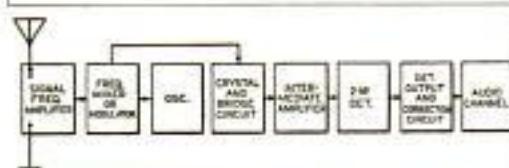
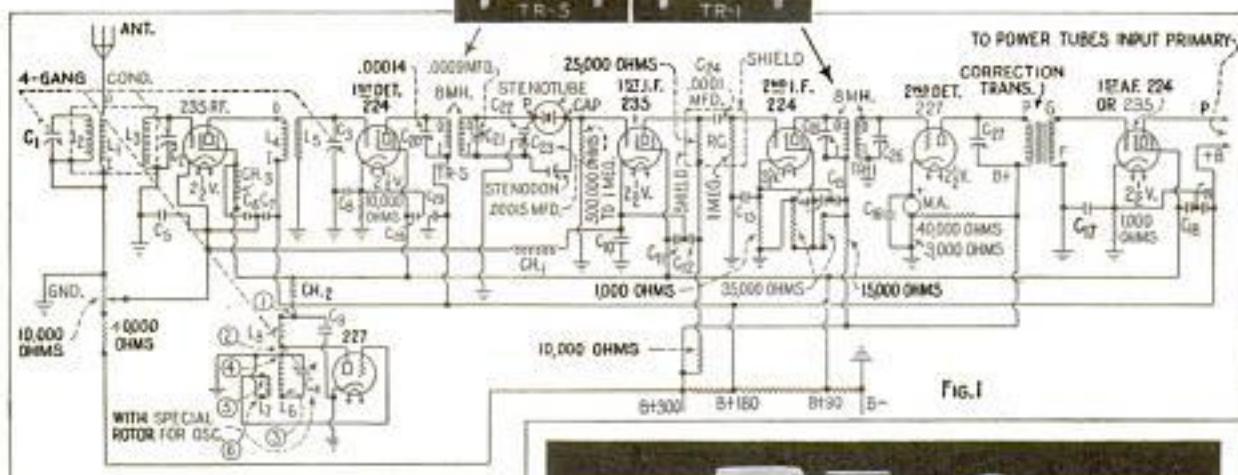
sion is employed to provide two speeds—one ratio of 1 to 10 for quick station location and a low ratio of 1 to 200 for the final adjustment. Both ratios may be controlled by a single knob. An 0-to-10 d.c. milliammeter is mounted above the dial and is connected in the circuit to act as a resonance or fine-tuning indicator. This greatly simplifies the fine tuning necessary for maximum results, as the receiver is tuned for the greatest swing of the needle.

The special parts required to build this receiver are all available, and the simplified diagram is made from the actual working model, demonstrated by Mr.

Lynch during the recent trade show at Chicago. The basic circuit diagram, Fig. 1, will give the experimenter an idea of the receiver at a glance. It will



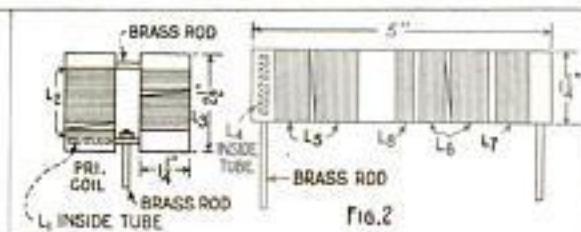
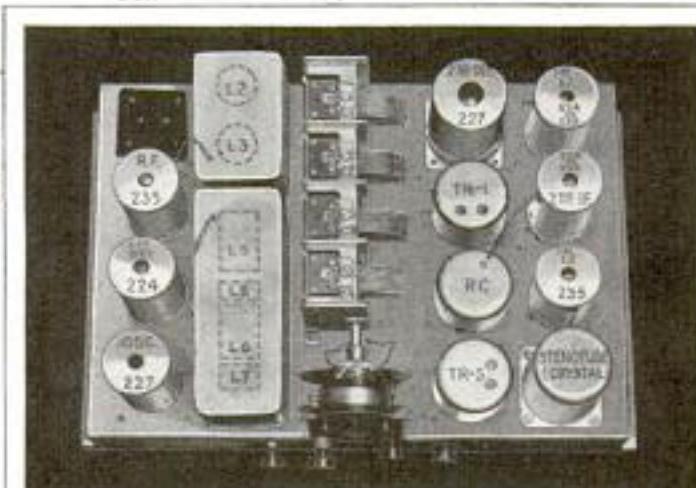
be .1 mfd., except C₁₆, C₁₇, C₁₈ and C₁₉, which are .25 mfd. The condenser C₂₄, which is the blocking condenser in unit RC is .0001 microfarad.



be noted that the only real deviation from the conventional superheterodyne lies in the crystal selectivity-control circuit and the compensated audio channel. This detector output and correction circuit employs an audio transformer to compensate for the attenuation of the higher audio frequencies, resulting from the use of the crystal in the intermediate amplifier. This may be a push-pull transformer designed for type-210 tubes working into a dynamic speaker; if this is not easily obtained, the type of transformer designed for two type-245 tubes in push-pull may be used. The transformer is mounted under the chassis together with all resistors and bypass condensers that can be concealed.

The intermediate-frequency transformer TR-S, shown at the left above the schematic diagram, Fig. 1, is especially designed for the 175-kilocycle Stenotube; TR-1 is a standard intermediate-frequency transformer for the same frequency operation.

All chokes are of small-disk type and the same size and have a minimum value of 8 millihenries. All by-pass condensers



The coils can be hand-wound as shown in Fig. 2, or they may be purchased ready for installation. The homemade variety may employ small lateral-wound choke coils, of the same value and type as the other chokes used, for the primary coils L₁ and L₄. These are inserted in the ends of the tubing as shown. The coil units are mounted on brass bushings, the length of which depends upon the height of the shield cans, but should clear the cans at least 1 in. all around.

It will be noted that the windings of

coils L₂, L₃, L₅ and L₆ are pushed apart at one point. This is to obtain a variometer effect when matching the inductance. The turns are merely slipped back and forth to obtain the desired result.

The data for the hand-wound coils are as follows: L₂, L₄ and L₅ consist of 110 turns each; L₆ of 80 turns; L₇ of 40 turns, and L₈ of 60 turns of No. 30 enameled wire.

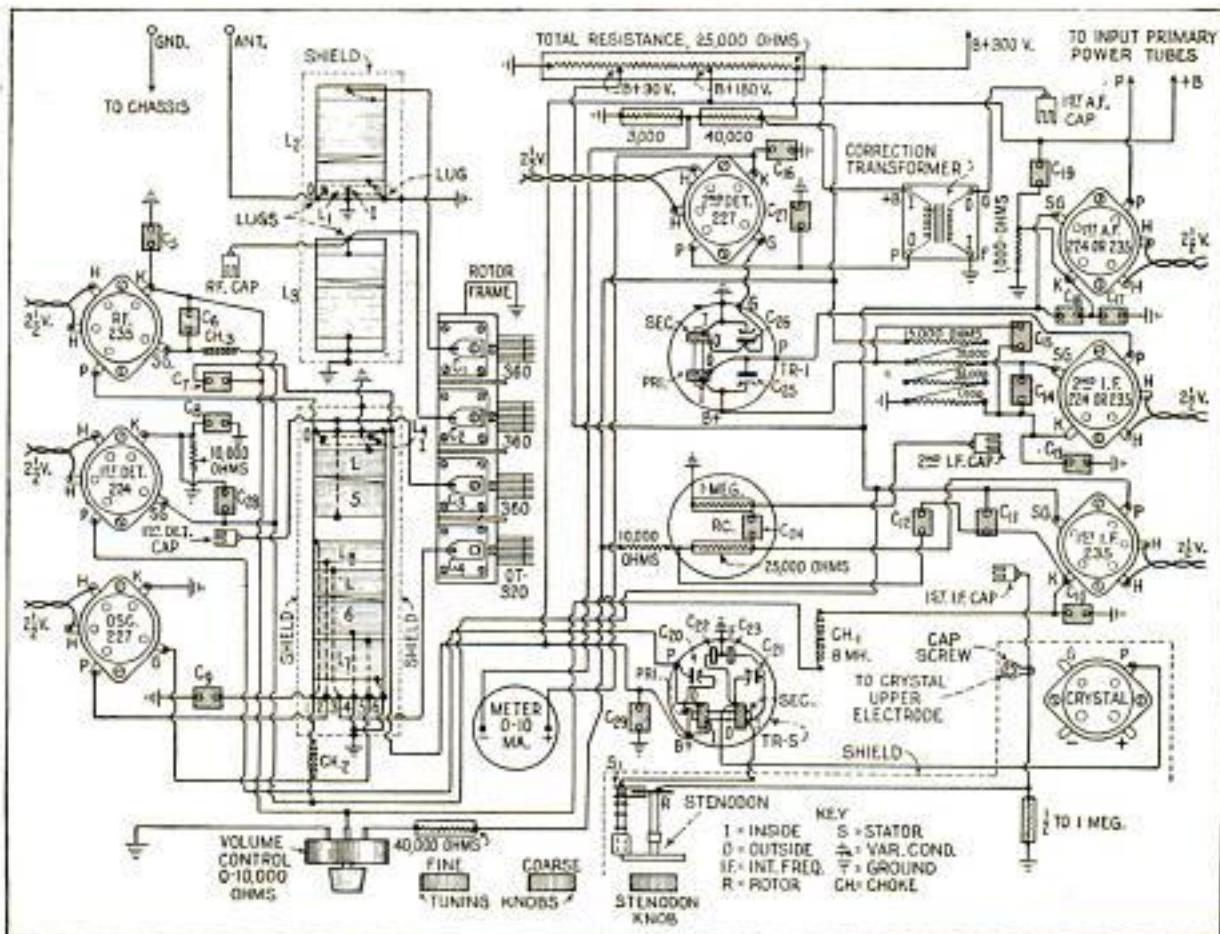
A shielded compartment must be constructed under the chassis to include the Stenodon condenser and the underside of the Stenotube socket. The base, 2½ in. high, 12 in. deep and 18 in. long, is made of ½-in. sheet metal. One coil can is 3 in. wide and 6½ in. long, and the other 3 in. wide and 4¾ in. long.

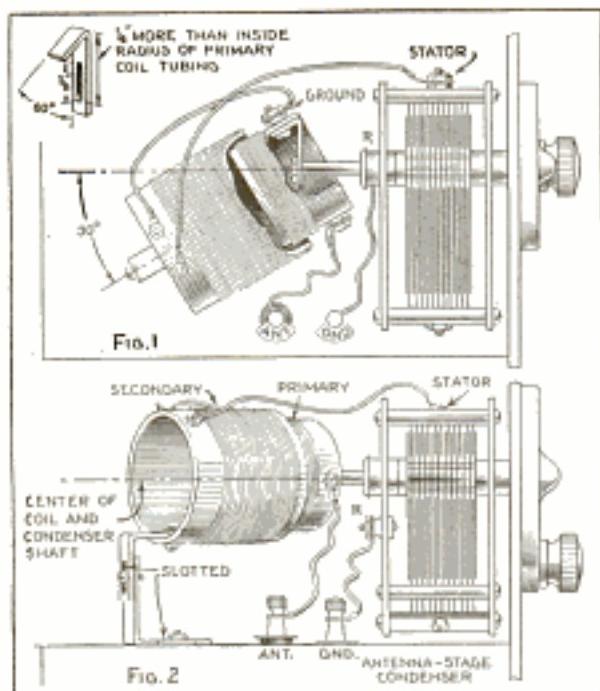
The resistance-coupled stage, RC, is built up on the chassis and is housed in a can. The two resistors and the coupling condenser C₂₄ are mounted on a small piece of bakelite, and this assembly is held upright above the chassis by a small bracket. The terminals on the ends of the coil forms are soldering lugs and are indicated by dots.



Large diagrams of the circuit and layout are available for those who wish them. A complete material list may be obtained upon application.

Any good power-amplifier supplying the necessary audio amplification, together with the proper filament, screen-grid and plate voltages, may be used.





Primary Loader Is Automatic

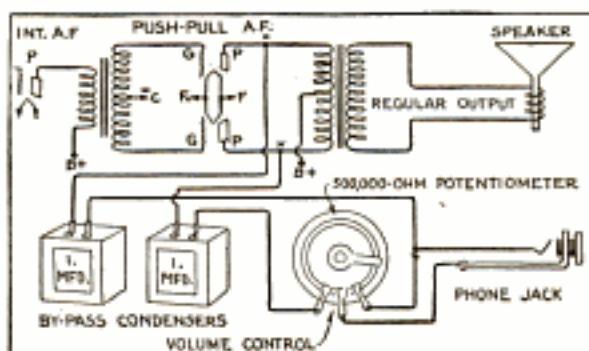
Turning with the condenser shaft, this primary loading coil changes position in relation to the secondary so as to maintain the same signal strength at both ends of the dial. To install this device, the shaft of the antenna-stage condenser is extended about 3 in. from the condenser frame. If the condenser shaft is of the removable type, this is a simple matter; if not, a coupling may be used to attach the extra length. The tubing on which the primary is wound is $\frac{5}{16}$ in. smaller in outside diameter than the inside diameter of the secondary coil. This is necessary in order that the primary coil may swing into the secondary as shown in Fig. 1. Both primary and secondary coils should be wound about $\frac{1}{8}$ in. from the ends of the tubing, the number of turns, of course, depending on the capacity of the variable condenser used. The coil forms may be coated with shellac and the wire wound on while the shellac is still sticky. The finished coils need not be coated. An angle of 30° is correct for the secondary, to give the best entrance to the moving primary coil. With the condenser plates all in, the primary coil should be fully inside the secondary, swinging outward and upward on an angle as the plates open. Fig. 2 shows the method of mounting the secondary coil on the adjustable bracket.—Henry S. Laraby, New Haven, Conn.

Baseboards Insulated against Leakage

Wooden baseboards used for radio receivers or transmitters should be given a coating of either clear or orange shellac. Where extra precautions against leakage are advisable, some experimenters boil the baseboard in paraffin. Black lacquer and other similar finishes, likely to contain pigments that would form leakage paths for the small radio currents, should be avoided.—Ross J. Plaisted, Brecksville, Ohio.

Installing Phone Jack for the Deaf

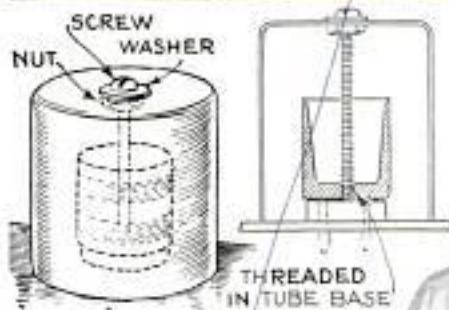
Headphones may be plugged into any receiver, for the benefit of a deaf member of the family, without disturbing the output of the speaker. The first step, as shown in the diagram, is to find the plate leads to the tube sockets. A 1-mfd. 200-volt by-pass condenser is connected to each plate as indicated at X, and the other sides to the outside terminals of the potentiometer. The center terminal is connected to the frame of the phone jack. The parts are mounted either on a small panel, or the jack and volume control on the side of the console and the condensers inside. The operator merely plugs in the phones and turns up the volume control to the desired volume for the deaf listener without interfering in any way with the operation of the set or loud speaker. In sets using straight audio-coupled output,



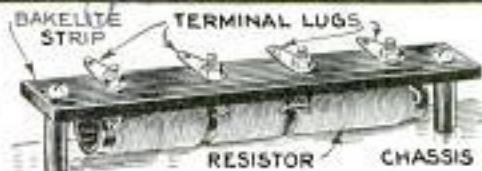
one condenser will go to the plate of the last audio tube and the other to positive-B for this tube. Tube adapters may be used without wiring into the circuit if desired.—John A. Kendall, New York City.

For further information on any radio construction article write to the radio department; this service is free.

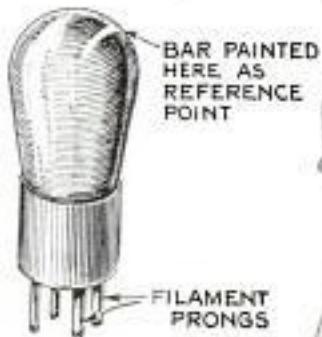
Easy Ways of Solving Your Radio Problems



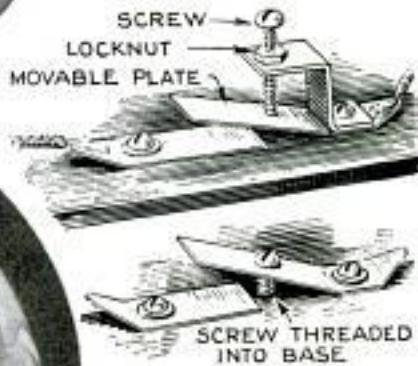
Above, Aluminum-Cup Shield Combined with Plug-In Coil; Right, Keying Relay Operates on A.C.; Below, Service Cubes Marked for Locating Filament Prongs Quickly When Changing from One Set to Another



Voltage-Divider Terminal Panel and Handle for Plug-In Coil Made from Scrap Bakelite



Below, Transmitter-Filament Supply Units That Operate on Either 110 or 220-Volt a.c. Lines

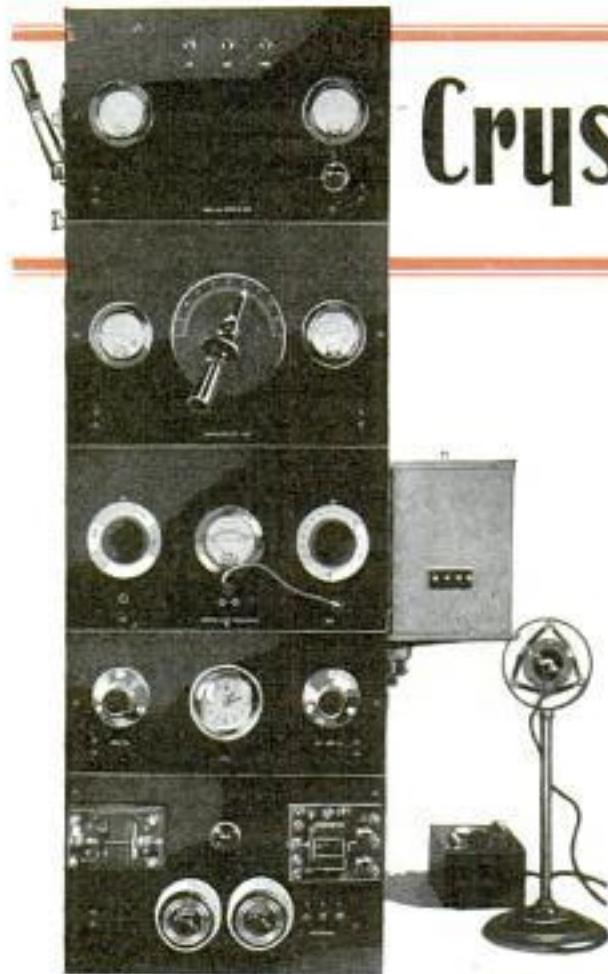


Above, Neutralizers, Trimmers, or Series Antenna Condensers for Short-Wave Sets May Be Made from 28 Gauge Sheet Brass or Phosphor Bronze, $\frac{3}{4}$ by $1\frac{1}{2}$ In.; the Angle Is Made from 1-16-In. Brass Strip; Left, Auto Lamp and Socket Handy for Checking Antenna Current



Simple Homemade Coil Winder with a Lower Spool for Spacing Turns; After Coil Is Wound, It Is Coated with Collodion and Dried, Then the Second Winding Is Removed

*Thordarson Mfg Co. Inc. Chicago
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Crystal-Controlled

by Frank L. Brittin

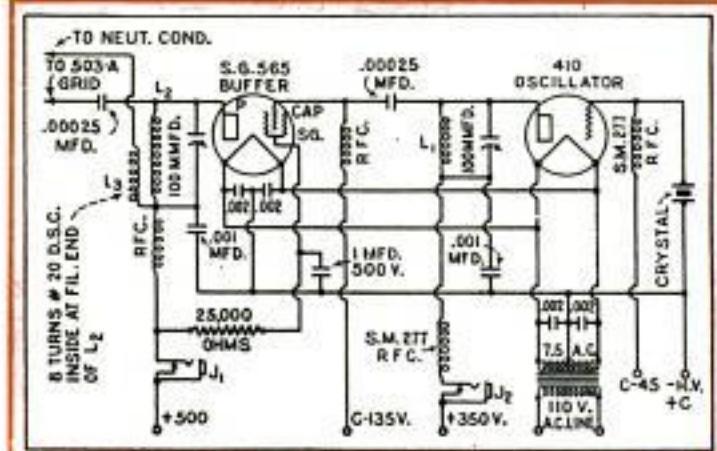
screen-grid voltage of the buffer tube employed in the foundation unit. The transmitter is placed on a heavy table and the power unit is installed on a shelf below.

The bottom unit contains a separate plate supply for the type-410 crystal-controlled oscillator and also the filament supply for this tube and the 565 buffer tube. The filament and plate-control switches, for the complete transmitter, keying relays and microphone-input jacks, are mounted on the front of this panel. In the next unit above are the additional filament-supply transformers and the necessary rheostats at either side of an electric clock. The third unit is the oscillator and buffer stage. The temperature-control oven, mounted on the shelf at the right, was described in detail in the June, 1931, issue. Directly below this shelf is a master switch in series with the 110-volt

PERHAPS the most difficult problem confronting the amateur radio operator is the arrangement of the various units that go to make up a modern key and phone transmitter.

Compactness and accessibility are easily obtained, however, by means of the unit method of assembly. This means that each stage is as complete as possible and properly shielded from preceding and following stages. The unit panel arrangement may be varied to suit individual needs, and, owing to the flexibility of this type of assembly, the builder may start with the foundation unit, described in this article, and add or change the following stages to any other type of transmitting circuit he prefers.

The five-panel assembly shown in the photo on this page is a complete 50-watt phone and CW-installation with the exception of a 1,500 to 2,000-volt power supply for the two 50-watt tubes and the



a.c. line and a small candelabra lamp mounted behind the large red jewel in the center of the bottom panel.

The panel next to the top is for the modulated 503-A r.f.-amplifier unit, and the top section contains the speech amplifier and a type-545 modulator tube. Details of the microphone-control box, shown at the left of the microphone, and construction data for the units described will appear in following articles; diagrams

Transmitter Unit

W 9 D C X

and material lists will also be available.

The frame for housing the transmitter is made of 1 by 2-in. channel iron, $17\frac{3}{8}$ in. wide, 11 in. deep and 50 in. high, and 1 $\frac{1}{4}$ -in. strap iron is used at the sides, back and top to hold the frame together. The shelf brackets are made of 1 by 1-in. angle iron.

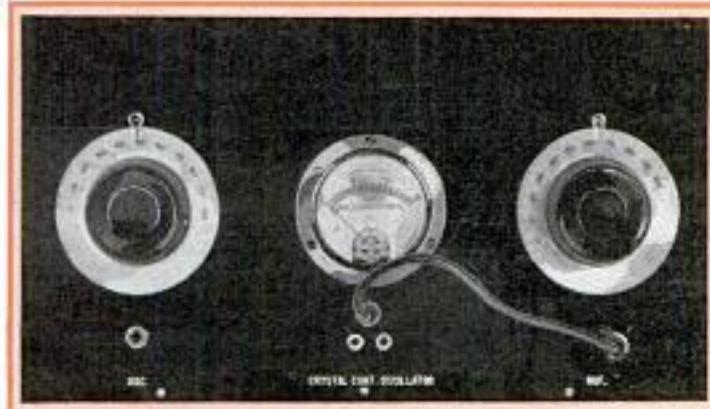
Four plywood baseboards, $\frac{1}{2}$ by $10\frac{3}{4}$ by $15\frac{3}{8}$ in., are required. These should be well sanded and coated with a good grade of shellac. No baseboard is used for the oscillator and buffer foundation unit, as the copper container rests directly on a shelf made of heavy sheet brass, $\frac{1}{8}$ by $10\frac{3}{4}$ by $15\frac{3}{8}$ in.

The construction of the foundation unit, a CW-transmitter in itself, is quite simple, as shown in the upper photo on this page. The container is made of No. 17 gauge copper, $14\frac{3}{4}$ in. long, $8\frac{1}{4}$ in. deep and 9 in. high. A flanged copper partition, with a cut-out for the meter at front, divides the box into two sections. The oscillator tube is at the left and the buffer at the right. A bakelite subpanel is used, and is raised above the bottom of the can by means of four 1-in. brass or fiber posts. This enables the builder to mount most of the small fixed condensers under the subpanel. The two 100-mmfld. condensers are of the new small two-bearing type. Coil L₁ consists of 18 turns of No. 14 enameled wire, wound on a bakelite tube

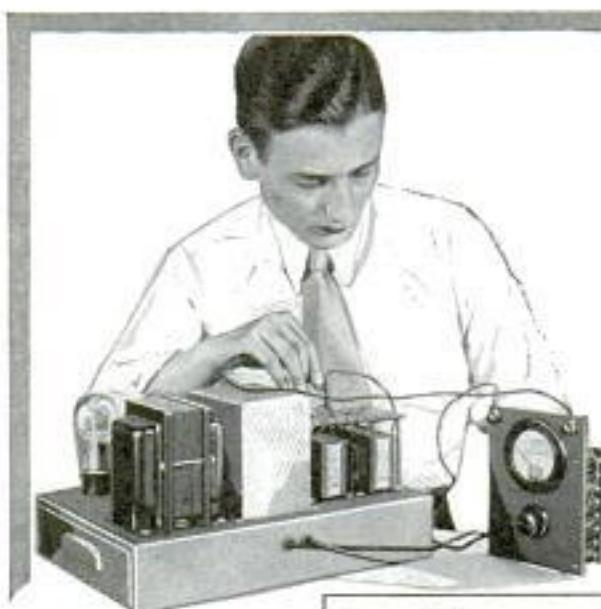


having an outside diameter of 3 in., and the turns are spaced the diameter of the wire. Coil L₂ is the same as L₁, and L₃ is a neutralizing coil, consisting of 8 turns of No. 20 d.s.c. wire, wound on a bakelite form that will fit inside the filament end of coil L₂. The lead from this coil is brought out through the side of the can and terminates in a clip for the .0001-mfd. neutralizing condenser mounted in the r.f. stage above.

The buffer output lead is also taken out to a clip for the grid terminal of the 503-A tube. The bakelite front panel is $\frac{1}{4}$ by $9\frac{1}{2}$ by $17\frac{3}{8}$ in. The two closed-circuit jacks J₁ and J₂ are mounted below the tuning condensers, and a flexible lead terminating in a plug is used to shift the d.c. 0-to-150 milliammeter from one stage to the other. Two phone-tip jacks for the crystal leads are mounted directly under this meter. The 1-mfd. 500-volt condenser is mounted on the back of the can, and all terminals are brought to soldering lugs at the rear of the sub-panel, leads being taken to a strip of binding posts on the shelf behind the unit.

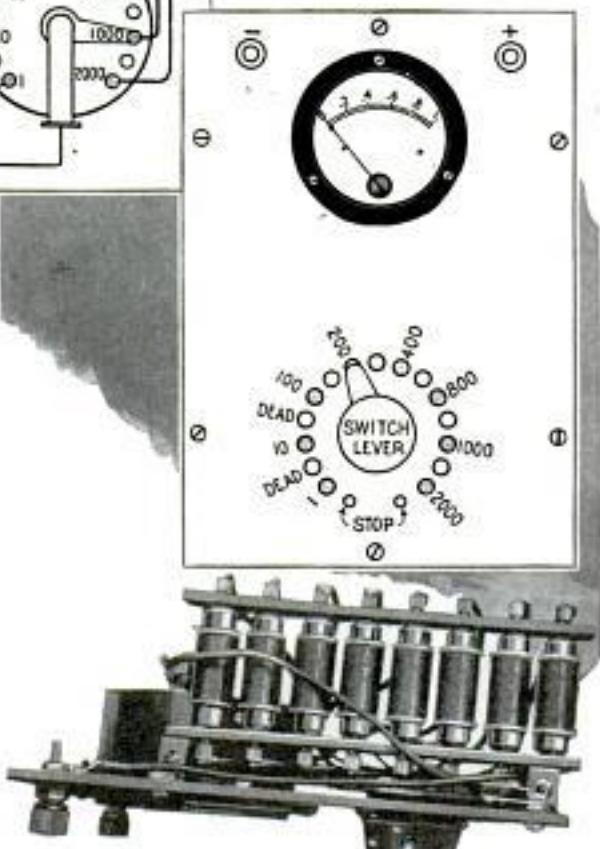
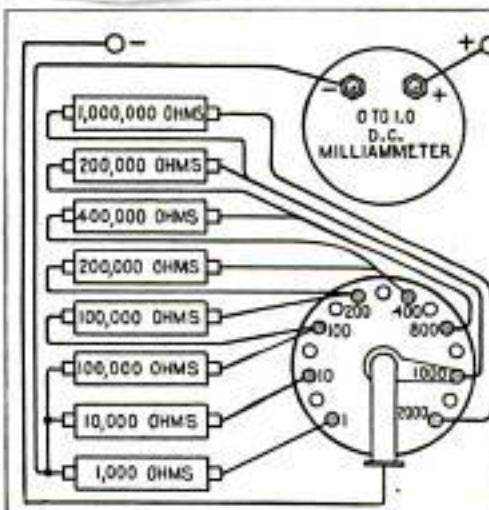


Milliammeter Serves as a Multi-Voltmeter



Experimenters who happen to have a good d. c. milliammeter, reading from 0 to 1, full scale, can easily make it serve as a multi-voltmeter by means of suitable multiplying resistors. The resistors, however, must be chosen with care, the new wire-wound variety being sufficiently accurate for the purpose. Individual voltmeters to cover the ranges indicated in the diagram would cost too much for the average experimenter. Therefore this simple, and comparatively inexpensive, means of obtaining a high-resistance d. c. voltmeter for 1 to 2,000 volts at 1,000 ohms per volt is well worth consideration. At 2,000 volts, the highest-value resistor should be capable of passing about 2 watts. If this type of resistor is not available, two 500,000-ohm resistors should be connected in series instead of using the single 1,000,000-ohm unit. It is, of course, understood that this meter is not to be used in the circuit continuously, as the resistors would heat and probably break down. A bakelite panel, $\frac{3}{16}$ by 7 by $5\frac{1}{2}$ in., or any size necessary to fit a box to house the instrument,

may be used. The illustrations show the arrangement of the milliammeter, multiple-point switch and binding posts on the panel. This switch is one of the common inductance types, but good contact should be provided as otherwise high resistance will be introduced and the calibration thrown off, especially at the higher voltages. The wire-wound resistors have small knurled nuts at both ends enabling the builder to use a single mounting for the entire group, as shown in the simplified wiring diagram. Two strips of bakelite, $\frac{1}{8}$ by $\frac{1}{2}$ by $5\frac{1}{2}$ in., are drilled to space the resistors about $\frac{1}{8}$ in. apart. The resistors are then installed and the entire assembly is mounted at the left side of the meter and switch with small angle brackets. It is well to check the completed unit with a standard voltmeter of similar range, so that proper allowance can be made for any defect in the resistor values.—L. B. Weitzel, Chicago.



Pre-Amplifier Improves Home Recording

by R.E. Clarke

WHEN your a. c. receiver lacks sufficient audio amplification for the proper operation of a microphone, home-made records want volume and tone quality. This pre-amplifier supplies the necessary punch and may also be used to convert a radio receiver into a small public-address system.

A simple transformer-coupled circuit is used, as other forms of coupling sometimes cause "motorboating," and the tone quality is limited only by the microphone and radio receiver with which the pre-amplifier is used. It is easily connected to the audio amplifier of any a. c. receiver without any internal changes in the wiring of the set. Two adapters replace the detector, or first audio, and one of the r. f. tubes in the set, and a small clip is connected to the ground binding post, or to any grounded metal part of the set. There are only two controls. A 1,000-ohm rheostat, which must have an off position, regulates the microphone current, the correct value of which is determined by the reading of the milliammeter. A volume-control potentiometer of 500,000 ohms is also needed, because the pre-amplifier cuts out the usual volume control of the set.

No batteries, or separate power supply, are required, but a small self-contained C-battery is used to furnish the microphone current. All heater, plate and grid voltages are supplied by the receiver.

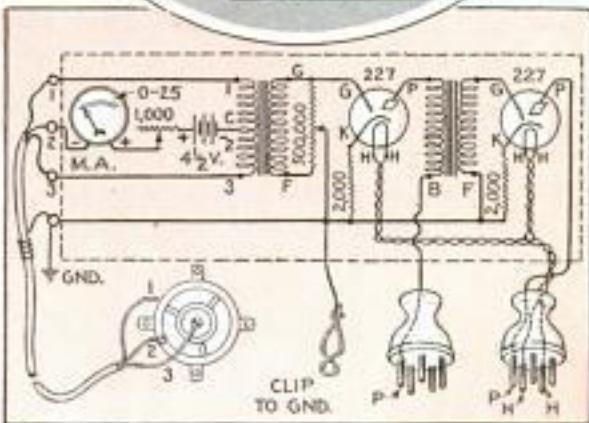
The unit has been tested with a number of standard receivers and in every case the loud-speaker response was equal in both volume and tone quality to a radio signal from a strong local station. When used on a home-recording machine, the volume was far greater and the tone quality better than with the ordinary equipment. Because of the wider needle cut, the life of the records will be longer.

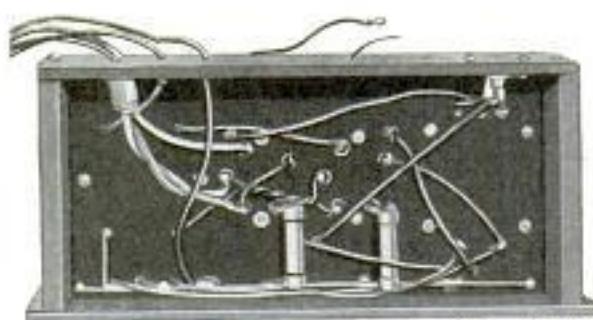
In this particular model, the three leads



from the two-button microphone were brought in at the rear of the cabinet to a special plug. This may be simplified, however, by mounting three binding posts on the front panel. If a single-button microphone is used, there would be but two leads, one connected at point 2 and the other at either of points 1 and 3, as shown in the diagram.

The circuit is so simple and free from feedback effects that no special precau-





tions are necessary in building. Almost any arrangement of parts that suits the builder will do, the arrangement in the model being chosen only for compactness and symmetry. It is a good idea to mount all the parts on the base first and complete as much of the wiring as possible before mounting the front panel. The bakelite base panel is $\frac{3}{16}$ by 5 by $10\frac{3}{4}$ in. and is supported by two wood strips, $\frac{1}{4}$ by $1\frac{1}{4}$ by $4\frac{3}{4}$ in., and two pieces, $\frac{1}{4}$ by $1\frac{1}{4}$ by $10\frac{3}{4}$ in. The bakelite front panel is $\frac{1}{8}$ by $6\frac{1}{2}$ by $11\frac{1}{2}$ in. The leads to the plug-in adapters should be as short as possible. The amplifier will be freer from hum if the heater wires are heavy, and these wires should be twisted.

The layout of parts is clearly indicated in the lower photo on page 745, the microphone transformer being at the right, the audio transformer at the left, and the two type-227 tubes between them. The volume-control unit is mounted on the front panel directly ahead of the audio transformer and the rheostat at the extreme right with the Weston type-301 0-to-25 d. c. milliammeter between. The leads for the $4\frac{1}{2}$ -volt microphone battery are brought up to binding posts on the base panel, and it will be noted that most of the wiring is done under the base as shown. The only parts mounted under the base are the two 2,000-ohm 2-watt fixed resistors.

It is a good idea to use shielded cable for the microphone leads; these shielded cables are grounded. They are connected to the buttons on the front and back of



the microphone, the frame to the lead going to the center post on the panel. The adapter plug with the single lead is plugged into any r. f. socket. If type-226 tubes are used in the r. f. stages, the five-prong socket is replaced with a four-prong type.

The adapter plug with three wires is plugged into the detector socket of sets not using a type-227 tube in the first audio stage. In the contrary case, plug the adapter into the 227-socket. The unit has two stages of amplification, so only one stage is required. If two stages are used, it will be necessary to regulate the volume carefully. Howling may be avoided by keeping the

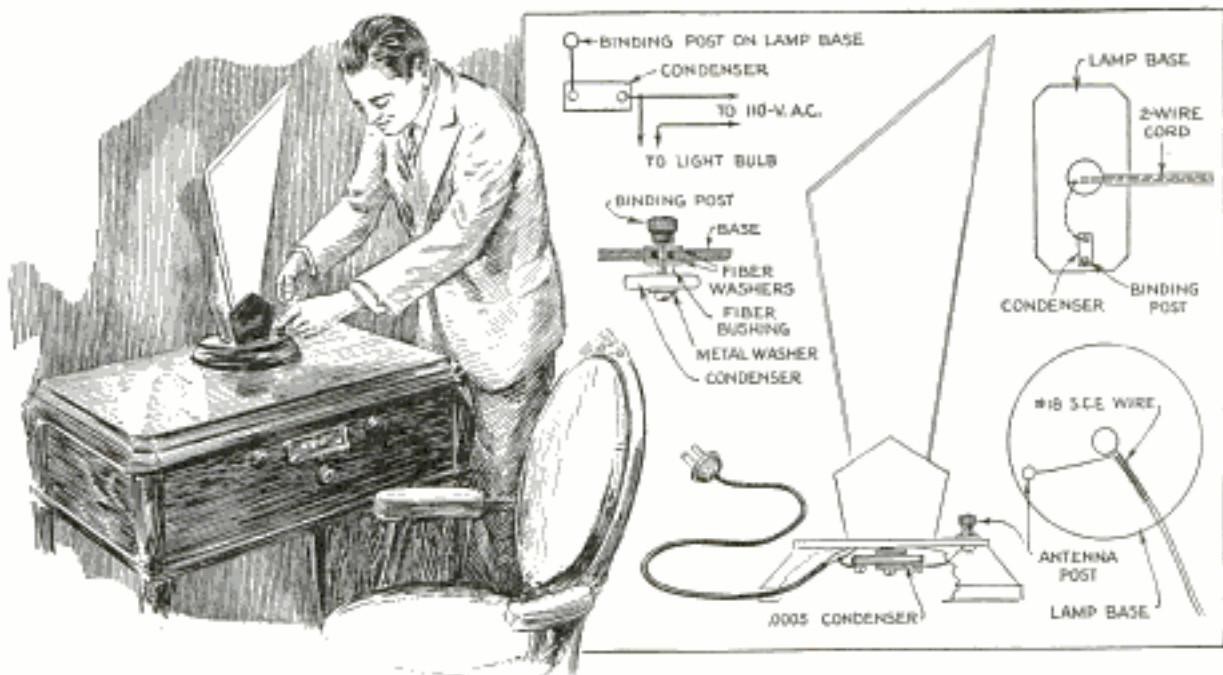


Top, Underside View and Details of Base Construction; Below, Front View of Completed Instrument

microphone as far as possible from the loud speaker. Simplified diagrams and a material list are available for those who wish them. To insure long life for the microphone, the current should be kept as low as possible with the rheostat. The outside dimensions of the cabinet are 7 in. high, 6 in. deep and $11\frac{3}{4}$ in. long.

Oil Increases Condenser Capacity

When a variable condenser of large capacity is required for the construction of a wavetrap, an ordinary .00025 or .00035-mfd. condenser may be adapted for the purpose. It is mounted in a can filled with either castor or transformer oil, which will raise the capacity several times its original value and also increase its ability to withstand high voltage.



Top, Left, Diagram Showing Condenser Connected to One Side of the Supply Line; Below, Condenser and Antenna Post in Position; Right, Optional Antenna Connection

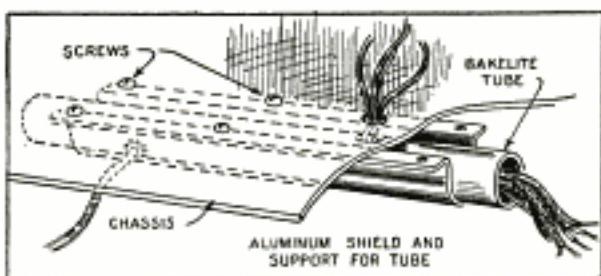
Homemade Radio Antenna Lamp

During the warm summer months many set owners will move the radio out on the front porch to furnish entertainment for lawn parties. Furnishing antenna and ground connections then sometimes is quite difficult, and the receiver is often put in a location that is more or less a disadvantage. Generally there are more convenience outlets around the average home than antenna and ground connections, so the advantage of having an antenna system within reach of the receiver at all locations would be appreciated by those who like to move the radio. Nearly every receiver has a lamp of some description adorning the top of the cabinet. Regardless of the style, it can be adapted to replace the antenna when portability is desired. A fixed condenser of .0005-mfd. capacity is mounted in the base of the lamp, as shown, and connected to a binding post on the base, but insulated from it. The condenser is connected to one side of the lamp cord. Another method consists in using a 30-in. length of No. 18 gauge s. c. e. magnet wire wrapped around the insulated cord supplying the current to the lamp. The wire is wrapped around that part of the cord between the outer edge of the lamp base and the entrance of the cord into the socket support. A layer of friction tape prevents

the winding from becoming short-circuited on the sides of the base. An optional layout, employing a two-wire cord for greater pick-up, is shown in the upper right-hand corner. If the cord of the lamp is connected in with the current-supply cord of the receiver, the set can be moved to any location, and the antenna connection will be made when the receiver supply cord is plugged into an outlet.—D. A. Brown, Marion, Ohio.

Shield for Wiring on Metal Chassis

Bakelite or fiber tubing, about $\frac{3}{4}$ in. in diameter, may be clamped under the chassis by means of a piece of sheet aluminum, bent as shown, to form an insulated conduit and shield for bunched wiring. The wires are led out of the tube at convenient points for wiring the circuit through holes drilled through the tube and metal chassis.



Insulating Conduit and Shield. Showing Method of Bringing Out the Connections



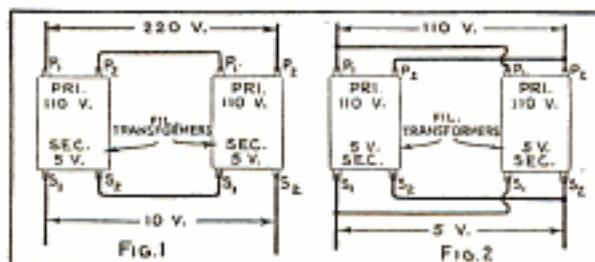
Inserting Combination Plug and Lamp Socket in Baseboard Outlet and Details for Altering Combination

Plug for Lamp Can Be Used as External Load

When testing power packs it is often necessary to insert a lamp, or other load, in series with the supply line so as to reduce the consumption of the unit under test. As the ordinary combination socket with a plug outlet on one side can be used only in a screw-socket receptacle, it must be altered to fit any standard outlet. How this can be done is shown in the sketch. Obtain a cardboard sleeve from an old candle-type socket and insert it in a short piece of thin brass tubing. The prongs are made of brass strips, shaped as shown and soldered to the end and screw-shell contacts, after which sealing wax is poured into the end to close the base.—J. M. Wallace, Toronto, Ontario, Can.

Transformers Ganged for Special Service

Filament transformers, of the same type and make, may be connected to serve purposes for which they were not originally designed. In Fig. 1 two transformers with 110-volt primaries and secondaries delivering 2.5 amp. at 5 volts are con-



nected so that the primaries can be supplied from a 220-volt source, while the

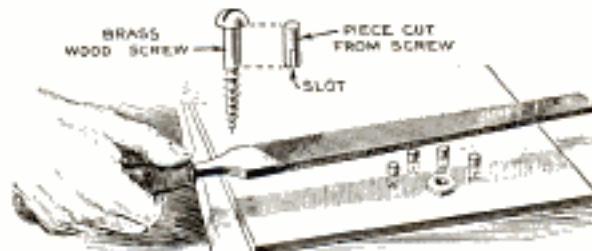
secondaries, in series, will deliver 10 volts, at 2.5 amp. If a secondary voltage of 5 volts with 220-volt operation is desired, the secondaries should be connected in parallel. This will deliver 5 volts at 5 amp. In Fig. 2, the transformers have their primaries connected in parallel, enabling their use on a 110-volt source. The secondaries, also in parallel, will supply 5 volts at 5 amp.

Useful Parts from Old Sets

Odds and ends of old receivers may be obtained from any radio store for little or nothing. These parts may be used in their original form in many cases or refashioned for constructing experimental equipment. The panels can be cut up for insulating material and the binding posts are always useful additions to the amateur's junk box.

Switch Taps Made from Wood Screws

Inductance switches, employing the usual tap arrangement, are also handy for cutting multiplying resistors in and out of multi-range voltmeters and similar



testing apparatus. Suitable switch levers may be salvaged from old rheostats or potentiometers, but the necessary taps are not always available. Such taps are easily made from the shanks of wood screws prepared as shown. A slot is cut in one end with a hacksaw to provide a good contact for the terminal wire, which is inserted and clamped with a pair of pliers before soldering. Holes are drilled in the panel to provide a force fit for the taps which are driven into place with a small hammer. The taps are then lined up with a sharp file.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are always available without charge.



AMATEUR MECHANICS

Skiboarding—a Thrilling Sport

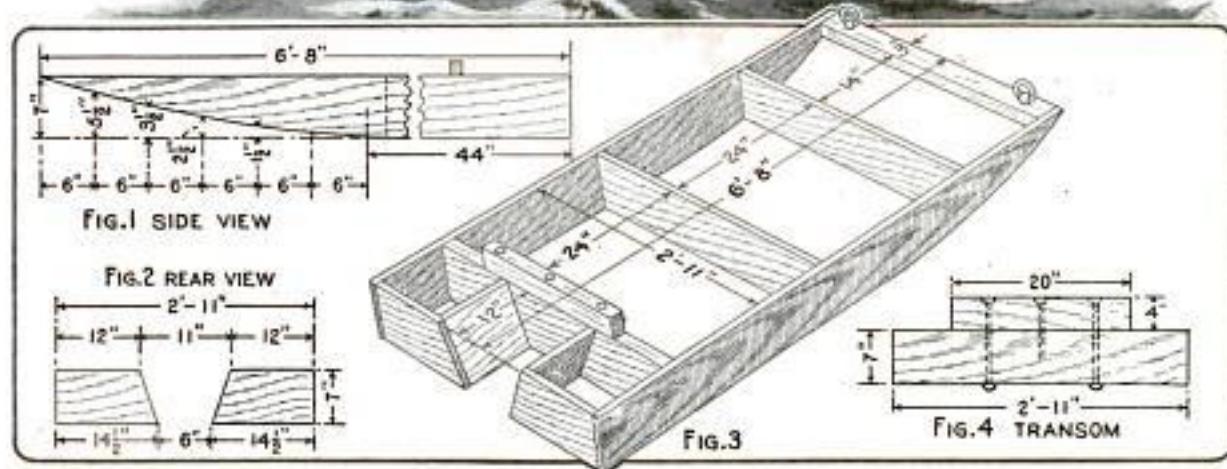
By R. D. POPE

UNQUESTIONABLY the skiboard is the most spectacular aquatic craft designed for sport. You can shoot the waves at high speed or get into an exciting game of water polo. Just hang onto the reins and steer by moving your body to either side.

Building a skiboard is no trick at all. A couple of days' work will see you through from start to finish. The first thing to do is to cut out a paper pattern for both sides as shown in Fig. 1. Trace the pattern on $\frac{5}{8}$ -in. pieces of spruce, cedar or cypress, and saw the curved edge carefully, using a keyhole saw if a bandsaw is not available. Then cut the two intermediate cross-pieces of the frame from the same material. The front piece is made from 2-in. stock, trimmed down to correspond to the curved line of the sides. Flat-head No. 5 brass wood screws, 2 in. long, are used in assembling, as they

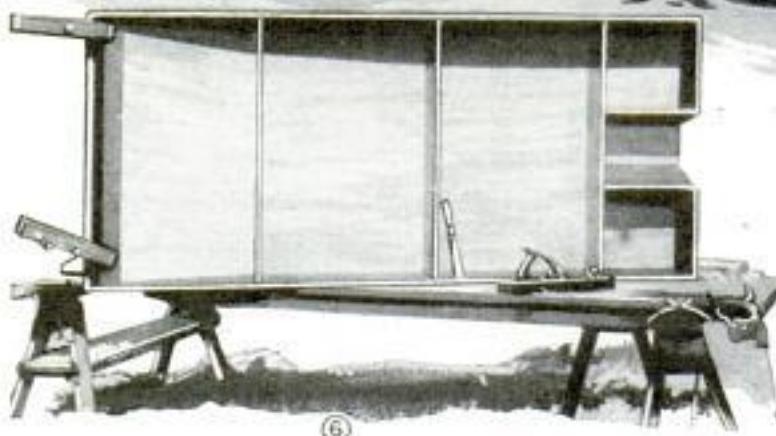
will not corrode. The work at this stage can best be done on a pair of horses, as shown in Fig. 5. The sizes of the cross and stern pieces are given in Figs. 2 and 3, while Fig. 4 shows the transom attached to the rear crosspiece. Both this and the transom are made of 2-in. stock and should be assembled securely as they are to hold the motor.

The unit consists of two separate pieces, drilled to receive $\frac{3}{8}$ by 11-in. carriage bolts, the heads and nuts being countersunk after allowance has been made for the thickness of the plywood top which is to be put on later. A 6-in. lag screw is driven in at the center. Plane the edges flush and square to avoid humps and hollows, which would make the skiboard ride badly, and then





In Water Polo a Course Is Arranged by Anchoring Barrels in Groups of Two About 300 Ft. Apart



apply two pieces of three-ply veneer, each of which measures 36 by 67 in., allowance being made for trimming. Waterproof plywood, which is manufactured for airplane construction, is preferable although not necessary. Wood clamps should be used to hold the forward end of the plywood, as shown in Fig. 6, so that there will be no distortion while driving in No. 6 flat-head brass screws, 1 in. long. Dress off all sharp edges with a plane, as shown in Fig. 7, so that they will not cut the canvas covering, applied next. Paint the entire bottom, back and sides 4 in. above the lower edge, using four-hour enamel and immediately tack the edge of a piece of medium-weight canvas, 44 in. by 14 ft. in size, to the back of the frame, 4 in.

from the bottom, slitting the canvas along the center of the motor slot so that it will cover part of the three inner sides of the slot. Use copper tacks here and space them about 1 in. apart. Then pull the canvas tight from the front, tacking it temporarily at the bow, after which the rest of the canvas is stretched tight over the top and temporarily tacked at the stern.

Now proceed with tacking the edges of the canvas below to the sides and, after painting the top,



overlap and tack the edges of canvas above, as is shown at the corner of Fig. 9.

When applying the plywood and canvas to the top the upper portion of the transom must, of course, be removed, which is done by loosening the bolts and reassembling later. A rubber washer should be placed under each bolt head to prevent entrance of water. A strip of molding is screwed directly over the overlapping edges of the canvas, applying marine glue to waterproof the lap, and similar pieces of molding, to serve as runners, are screwed along the lower edges, as shown in Fig. 9. The runners prevent undue wear on the edges when pulling the skiboard over a dock. A good coat of paint is now applied over the canvas, as in Fig. 8, letting it dry in the sun. All that is now left to complete the craft, is the insertion of two eyebolts at the bow, spacing them at equal distance from the sides and coating them with marine glue

before driving home, after which a length of sash cord is tied on to serve as a "rein." The motor must be clamped on tight so that it cannot pivot from side to side as this would affect the steering. After cranking the motor, lean forward with your hands on the deck, holding the ropes so that, the moment the skiboard runs even, you can stand up.

Water polo is an exciting game with four players, each maneuvering a skiboard. First arrange a course by setting out four barrels in groups of two, about 300 ft. from goal to goal. With four players there are two teams, one player of each team acting as a guard and staying at his opponents' goal, while the other does most of the shooting. The referee throws a 6-in. rubber ball into the middle of the "field" and the forwards, equipped with bicycle-polo or croquet mallets, run in from opposite sides, attempting to drive the ball to their own goal. Drives of 40 and 50 ft. are possible, and one of 60 ft. has been made in trial games.

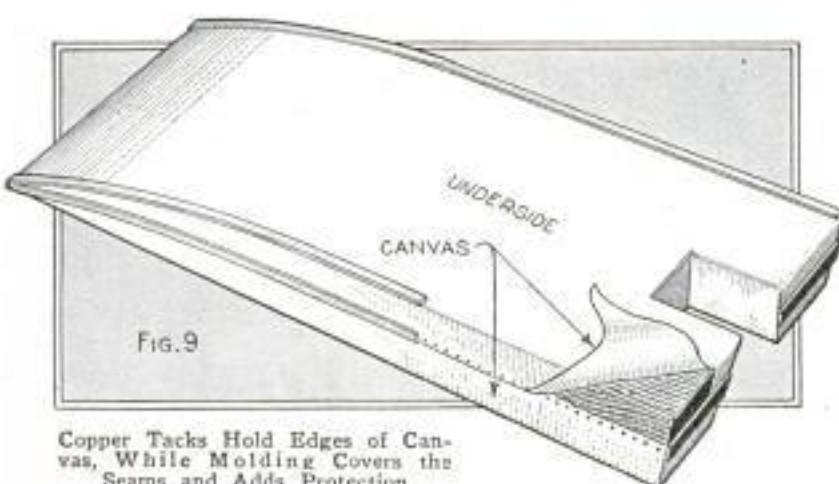
It may be desirable as a safety measure to install a knife switch on the motor that will automatically short-circuit the ignition, thereby stopping the motor in an emergency. One terminal of the switch



is grounded and the other is connected to the cut-off button, the switch being arranged so that when the rider jerks or pulls a light cord tied to his wrist and the switch, the latter will close. This is a good idea to prevent an unoccupied skiboard from racing around at large, menacing other boaters in the vicinity.

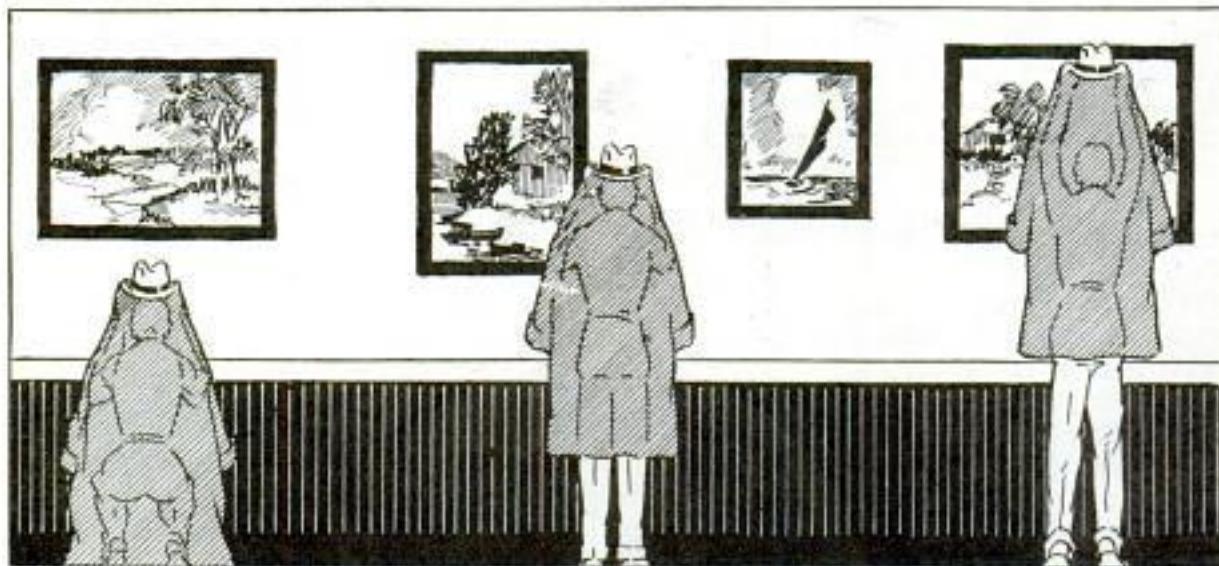
Grease Prevents Battery Corrosion

Heavy grease, such as is used in universal joints, will prevent corrosion on storage-battery terminals. Remove the cable clamps from the terminals, scrape off the corrosion and brush clean with a strong solution of washing soda. Then the clamps are replaced and a generous coating of grease applied. This will resist the battery acid and will also prevent the clamp from rusting. Do not put the grease on the parts until they have been connected and tightened.



Copper Tacks Hold Edges of Canvas, While Molding Covers the Seams and Adds Protection

This "Fast-Growth" Illusion Scores a Big Hit



The effect of this mysterious and laughable illusion is the apparent growth and shrinkage of a person in full view of an audience. Quickly stepping out of the room, throw a long overcoat or ulster over your head and shoulders, letting the collar come up over your head, then take a man's hat, and hold it over the top of the coat collar as shown. Pinch the two well together and drape the coat over the shoulders to the front. Crouching as low as you can by bending the knees, walk or glide into the room sideways with

your back to the audience. Now bend over slightly to the right and left, as low as possible, repeating this as you slowly raise yourself until you have reached your full height. Then, grasping the hat and coat tightly, repeat the same movements as you gradually push them up as far as you can reach on tiptoe. Then reverse the process and come down the same way. This original creation has been shown to the most critical audiences and has always scored a great hit.—B. L. Gilbert, Chicago.

Homemade Explosive Splits Logs

Heavy logs can easily be split with a cheap explosive consisting of equal parts of granulated sugar and chlorate of potash, a household remedy often used for

sore throat. A log, 24 in. in diameter and 10 ft. long, was split with three tablespoonfuls of this mixture, which was poured into a 1-in. hole drilled in the center of the log about 1 ft. from the end. The explosive was set off with a length of fuse inserted in the hole, which was then tamped full of dirt. The chlorate of potash can be purchased at most drug stores for a few cents a pound, and the explosive is less dangerous to handle than other kinds.—S. E. Grover, Peru, Nebraska.



Large Log Split by Homemade Explosive of Sugar and Chlorate of Potash

Coloring Photographic Prints

Color finishes of wide variety can easily be applied to any photo without toning powders or other chemicals. Take photographic or other transparent oil color and thin it with turpentine to such a consistency that a wad of cotton will readily ab-

sorb it. Be sure to use nothing but turpentine for the thinner. Squeeze out the surplus color and rub the cotton wad over the print, first lengthwise and then crosswise, rubbing the color into it until the surface is dry.

An Acid-Proof Cement

A cement that is acid-proof can be made as follows: A quantity of India rubber is melted over a slow fire, and tallow, equivalent to 6 or 8 per cent of the rubber by weight, is then added and thoroughly mixed. In 24 hours, slaked lime is stirred in until the mixture assumes the consistency of soft paste. About 20 per cent of red lead is then added, which causes it to harden and dry when used.

Metal Stakes Hold Tent Securely

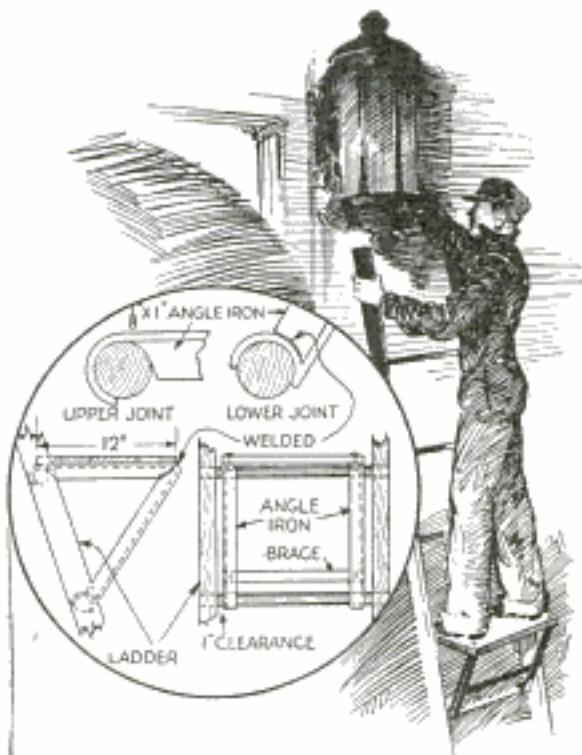
Metal tent stakes can be made from 15-in. lengths of $\frac{1}{4}$ -in. iron rod, which are bent over a wooden form made of 1 by 4-in. hardwood stock, as shown in the upper detail. The form consists of two blocks nailed together with a hole, 2 in. deep, drilled into one piece to receive the end of the rod, after which the latter is bent over the rounded end as indicated. Metal stakes last much longer than wooden ones, and take less space when packed in the automobile.



Tool for Cutting Moldings
for Model Ships

Kerosene Kills Lice on Dogs

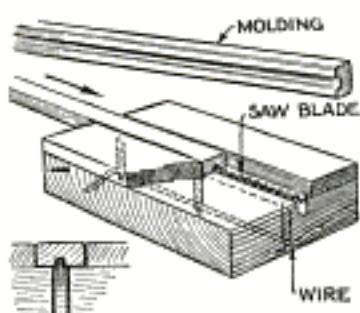
For killing lice on dogs, a cheap and effective remedy can be made by adding a little kerosene to soapsuds. Wait until a warm sunny day and apply the liquid gently until the dog is thoroughly wet. Do not rub the mixture into the skin as it may irritate. If the first treatment does not kill all the lice and mites, repeat it again in a few days.



Those Who Constantly Work on Ladders Will Find This Platform More Comfortable Than the Rungs

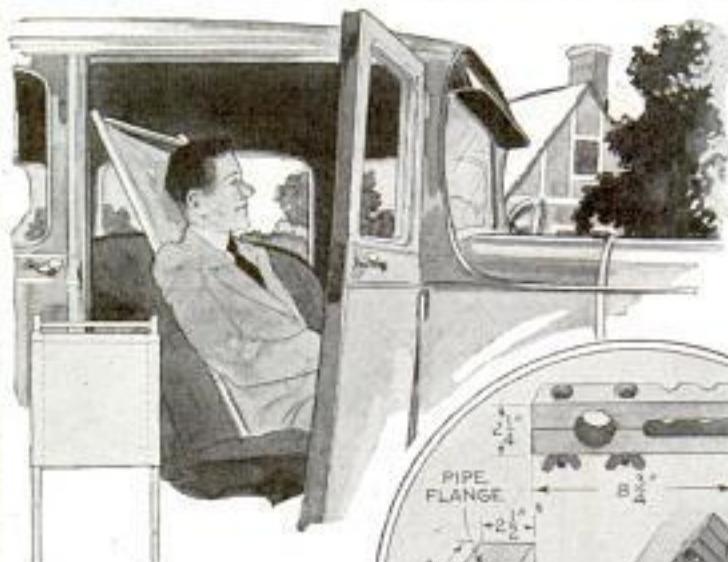
Ladder Platform Eases Tired Feet

When it is necessary to stand on the rungs of a ladder for a considerable length of time, a footrest or platform slipped over two adjacent rungs will be found comfortable. The one shown here consists of two lengths of angle iron, cut and bent as indicated, to form brackets to which the platform is bolted. Both ends of the angle irons are bent to form hooks to fit the rungs, while the cut part at the bend is welded to strengthen it.



This tool, made from a coping-saw blade and a wooden block, is useful in cutting moldings for model ships. The blade is held in a groove cut in the center of the block by means of fine wire, as shown. Small cleats are glued to the top of the block on each side of the saw as guides for the work.

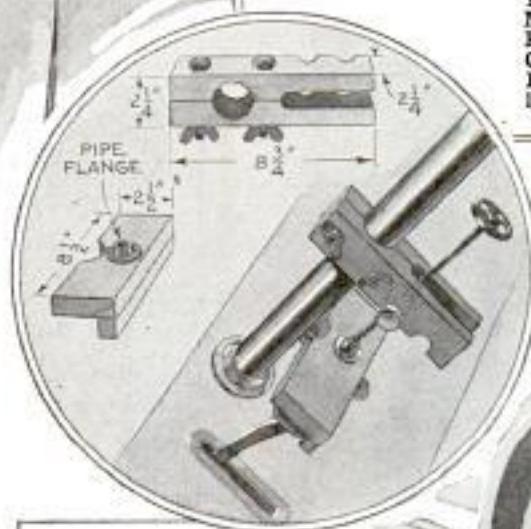
Seven Auto Short-Cuts Worth Remembering



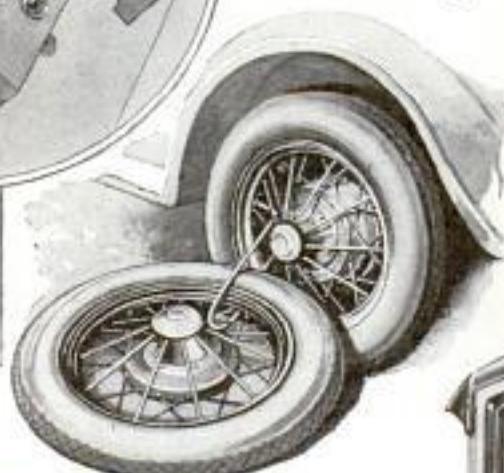
Here Is a Comfortable Headrest That Enables the User to Snatch Some Sleep on Those Long Night Drives



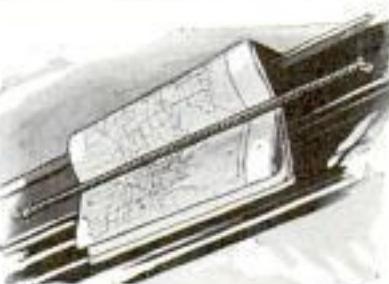
Coil Spring Holds the Oil-can Down, While Rifle Shell Caps the Spout



If Your Tire Pump Won't Work, Air Can Be Transferred into the Flat from Your Spare



Left, Felt Weather Stripping Attached to Auto Door Posts with Rubber Cement Will Keep Out Dust and Cold Drafts



For Holding the Road Maps in a Convenient Place, Stretch a Light Coil Spring across the Front of the Car Directly above the Windshield

Clamped to the Steering Post, This Brake-Pedal Depressor Has a Hand-screw That Gives a Gradual Range of Pressure Needed for Making Adjustments Accurately

Right, by Placing Your Ear to One End of a Mailing Tube Inserted in the Crankcase Breather Pipe, It Is Comparatively Easy to Detect Compression Leaks, as the Defective Cylinders Cause Louder Hissing Than Those That Are Tight.



Ventilating Your Shoes to Avoid Perspiring Feet

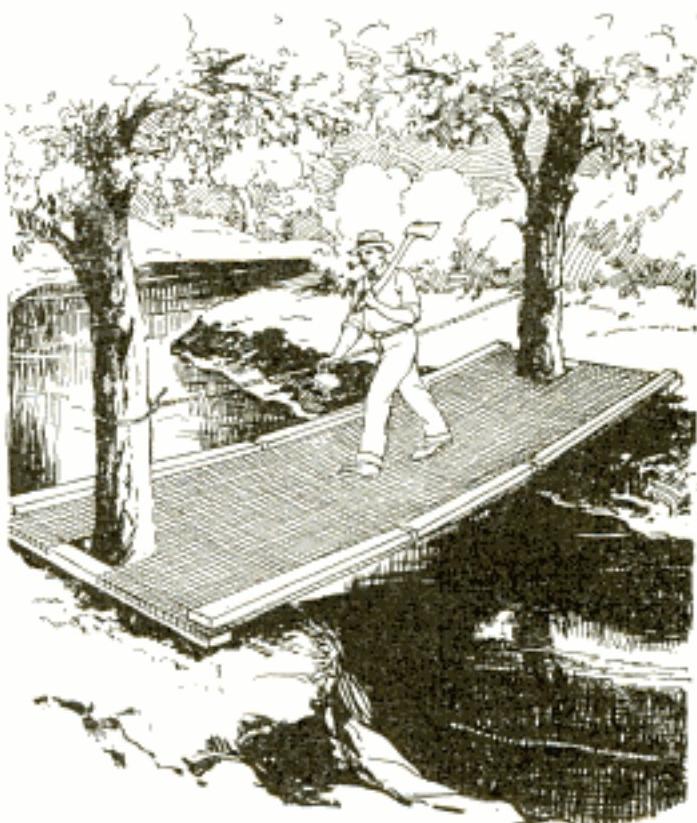
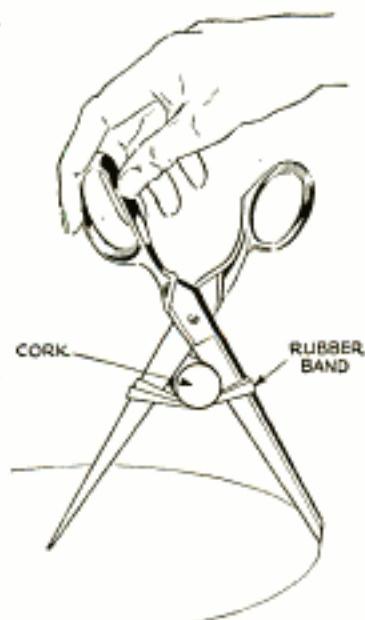
Those who are troubled with perspiring feet will get relief by ventilating their shoes. This can be done so that it will not be noticed by purchasing shoes that are decorated with perforated strips and punching holes through the leather directly under the perforations. Place a wooden block inside the shoe. The holes will still look the same, but will allow the air to get in and out of the shoe as the foot moves.—I. Clyde Cornog, Philadelphia.

Rattling Brake Rods Silenced with Door Spring

Brake rods that rattle can be silenced by the use of an ordinary screen-door spring. Fasten one end of the spring to the rod and the other end to the opposite side of the frame. The tension of the spring will hold the rod firmly against the guide clamps, without interfering with operation of the brake.—Albert L. Ball, Cleveland, Ohio.

Compass Improvised from Scissors

When a compass is not available, one can be quickly improvised from a pair of scissors, a small cork and a rubber band. The cork is placed between the scissor blades and is moved up or down to get the desired radius, after which the rubber band is slipped over the blades and under the cork as shown. This holds the blades firmly against the cork, and the compass at its setting.



Meshed Fencing Wire, Stretched across a Small Creek between Two Trees, Serves as a Footbridge

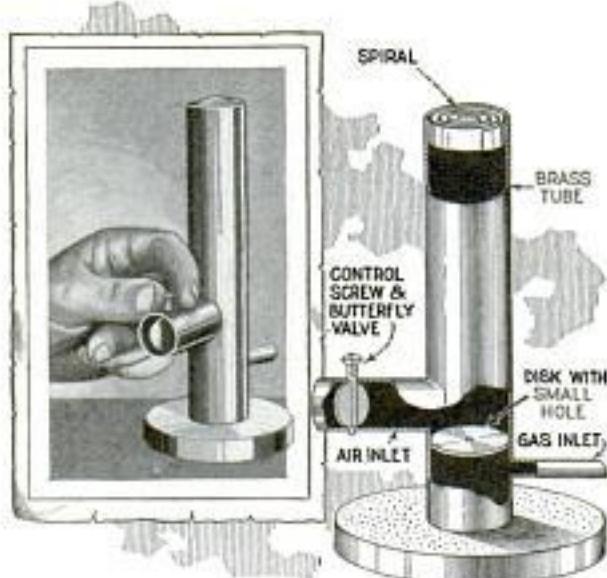
Footbridge from Fence Wire

Ordinary meshed fence wire can be used to make footbridges across small creeks. The wire is stretched across the creek between two trees or posts driven into the banks. The ends are stapled to two lengths of 2 by 4-in. stock to hold the wire taut. Lengths of the same stock are also attached to the edges of the fencing to give extra rigidity. Boards can be laid on the wire for a walk if desired. A rope stretched between two supports, nailed to the trees about 4 ft. above the ground, will serve as a handrail.—C. C. Ames, Mayville, N. D.

Transparent Coin Wrappers

Coin wrappers can be cut from standard sheets of cellophane. As this material is transparent it is not necessary to print the denominations on the wrappers, and the coins can also be readily counted without disturbing the package.

■ A set of two blueprints, SN-7 and SN-8, on "Aero Boat" can be obtained for 50 cents and a material list will be sent free.

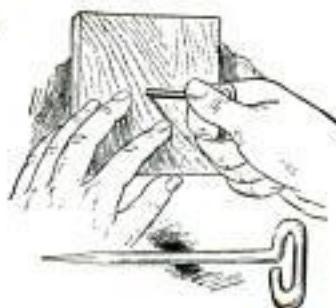


Made of Brass Tubing, This Adjustable Bunsen Burner Generates an Intense Heat

Super-Burner Gives Intense Heat

Unusually high temperatures can be obtained with this Bunsen burner, which uses city gas for fuel. It consists of a 7-in. length of brass tubing, $1\frac{1}{4}$ in. in diameter, and is fitted with gas and air inlets as shown. A brass disk, having a small hole in the center about the size of a darning needle, is soldered inside between the gas and air inlets, while a length of flat brass is bent to form a spiral, which is inserted in the top of the tube. A butterfly valve is provided in the air intake, while a tin lid, filled with plaster of paris, provides a base for the burner. In use, the valve in the air inlet is closed and a lighted match is held at the top after turning on the gas. The valve is then opened until a blue flame is obtained. This burner will quickly melt glass, and will be useful whenever an exceptionally hot flame is needed. It will be found handy around any workshop.

How to Drill Holes in Plaster without Chipping It



Holes can be drilled in plaster without breaking or chipping it by the use of a wooden block and a piece of iron rod bent

to form a handle and ground to a square point at the other end. A hole to receive the rod is drilled through the center of the block. In use, the block is held firmly against the plaster, and the rod is inserted and turned back and forth to make a clean-cut hole through the plaster.

Mending Cracks in Stoves

Cracks in the iron casing of a stove can be mended with a cement made by mixing iron filings with silicate of soda to a thick paste. This is forced into the crack with a putty knife, and the surface over and around it is covered with the same material. The heat hardens the cement, making it almost like iron. Another good iron cement can be made by mixing iron filings, flowers of sulphur and water to a stiff paste, applying it in the same manner. The mixture burns when heated and turns into iron sulphide, which fuses onto the iron of the stove.

Combination Fine and Coarse Pen

For those doing work that requires a fine point and a stub point, this penholder will be found useful. Cut a slot in one of the pen points and a similar one in the ferrule on the holder, as shown. Then solder the head of a small cotter key in a hole drilled in the other pen point, and fit both in the holder with the key head projecting through the slot. To change the relative position of the points, slide the key up or down.—John French, Saint John's, Quebec, Can.

Rubbish Kept Out of Roof Gutters Prolongs Their Life

Prompt removal of leaves and other rubbish accumulating in gutters, will prevent the downspout from being clogged, which causes the water to flow over the edges of the gutters. This overflow may cause much damage if the gutters run into the cornice so that the water goes down in-

side of the walls. If it flows down on the outside, stains on the paint will result. Decayed leaves will cause the gutter to corrode and eventually leak. Cinders and cinder dust will also set up a corrosive action. When dirt of this kind is removed, the gutter should be flushed out with clean water to rid it of all traces of acid resulting from such decomposition. The life of gutters and downspouts can also be prolonged by occasionally giving them a coat of good metal paint.

Bumpers for Wheeled Toys Made of Hose and Cable

Children often scratch the furniture when riding their toys indoors. This trouble can be prevented by providing a bumper, consisting of a suitable length of cable run through a piece of rubber hose of the same length. The bumper is fastened by means of flat-head screws inserted in holes drilled through the hose and cable. For metal toys, the bumper can be attached with improvised clamps. The length of the bumper, of course, depends on the size and shape of the toy.

Andirons Made from Old Pistons and Connecting Rods

Andirons can be made from discarded pistons, connecting rods and lengths of angle iron, the latter being bolted to the top of the pistons and either welded or bolted to the connecting rod, as shown. Made in this manner, they will afford plenty of clearance for draft.—M. F. Thurmond, College Station, Tex.



Serviceable Andirons Can Be Made from Discarded Pistons, Connecting Rods and Angle Iron



Cane Fitted with a Swivel Caster Is a Great Improvement over the Type Ordinarily Used by Blind People

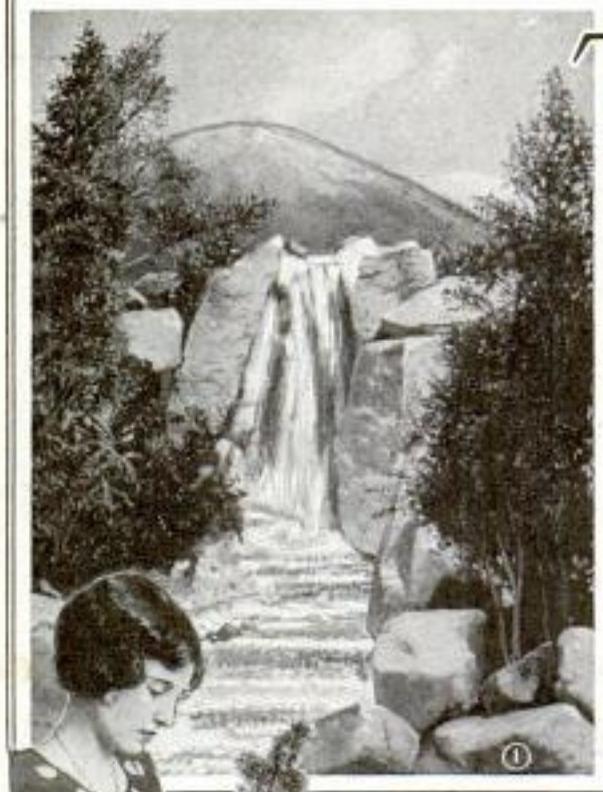
Cane Fitted with Caster Aids the Blind

The blind man's walking stick can be improved by fitting it with an offset swivel caster, as this eliminates the necessity of constant tapping. The illustrated cane was made from an old billiard cue. A hole was drilled in the lower end to receive the shank of the caster, and a ferrule was slipped over the end to prevent it from splitting. The user can tell by the sound when the wheel is rolling over earth, concrete, brick or asphalt.

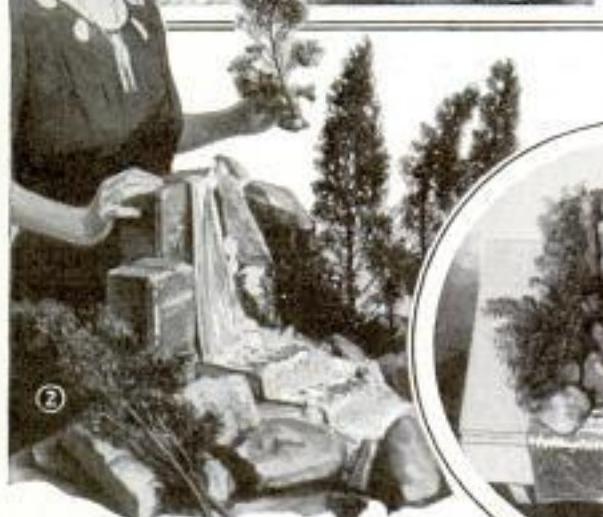
Paper Helps to Get Car Out of Mud Hole

Crumpled newspapers fed under the rear wheel of a car sometimes will provide sufficient traction to get it out of a small mud hole. If a layer of several thicknesses is spread from the wheel to solid ground, the car can usually be run out under its own power. This is a faster and much cleaner method than putting on skid chains, and often they are not at hand when needed if an emergency such as this is to be met.

Table-Top



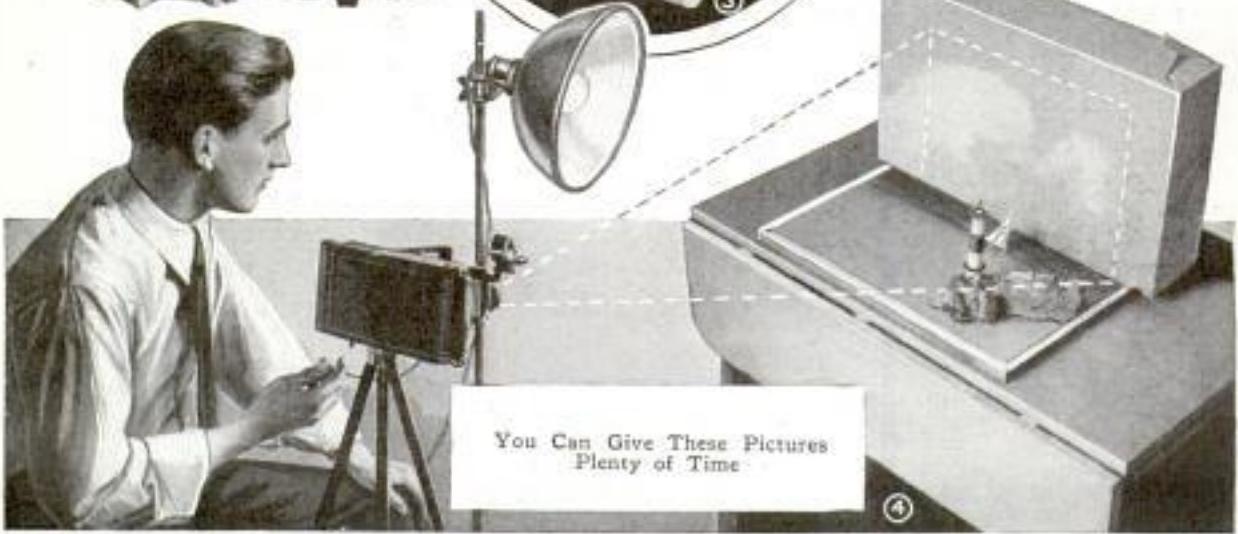
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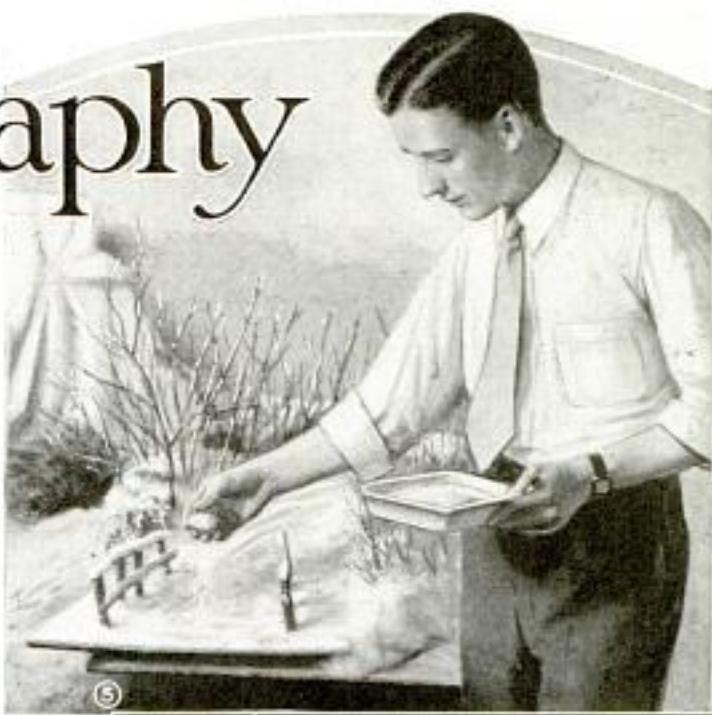
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You Can Give These Pictures
Plenty of Time

Photography

the dangerous reef. Fig 4 shows the relation between the set and the camera and the position of a lamp. As no action is required in any of these pictures, time exposures may be given. With a cluster of bulbs, totaling about 250 watts and located about 4 ft. from the set, the average camera will take a good picture, with a f. 16 stop and a full minute of exposure. By doubling the light, the exposure time can be cut in half, and if a normal flash, either bulb or cartridge, is used, a full-timed negative can be obtained in one twenty-fifth of a second.

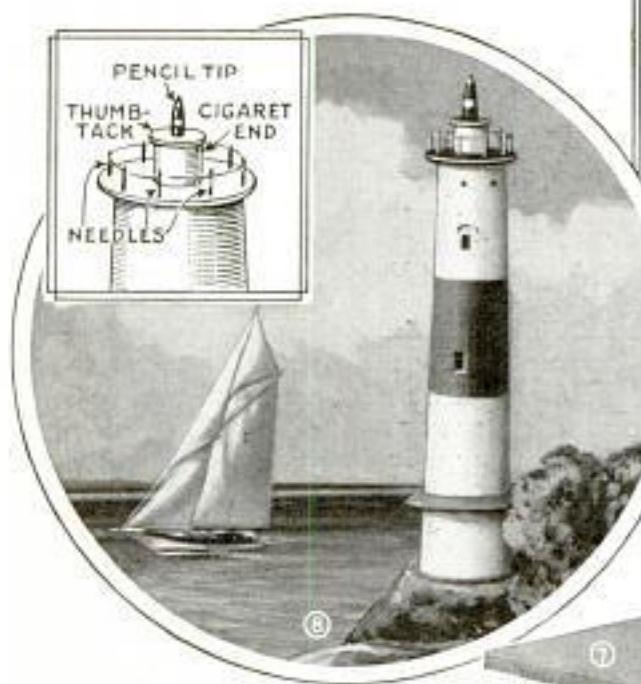
The lighthouse can be made by rolling a sheet of paper, and pasting the end down to hold the conical shape thus formed, as in Fig. 7. Each end of the tube is cut off square. The top is fashioned from a disk of cardboard, onto which a $\frac{1}{2}$ -in. length snipped from the end of a



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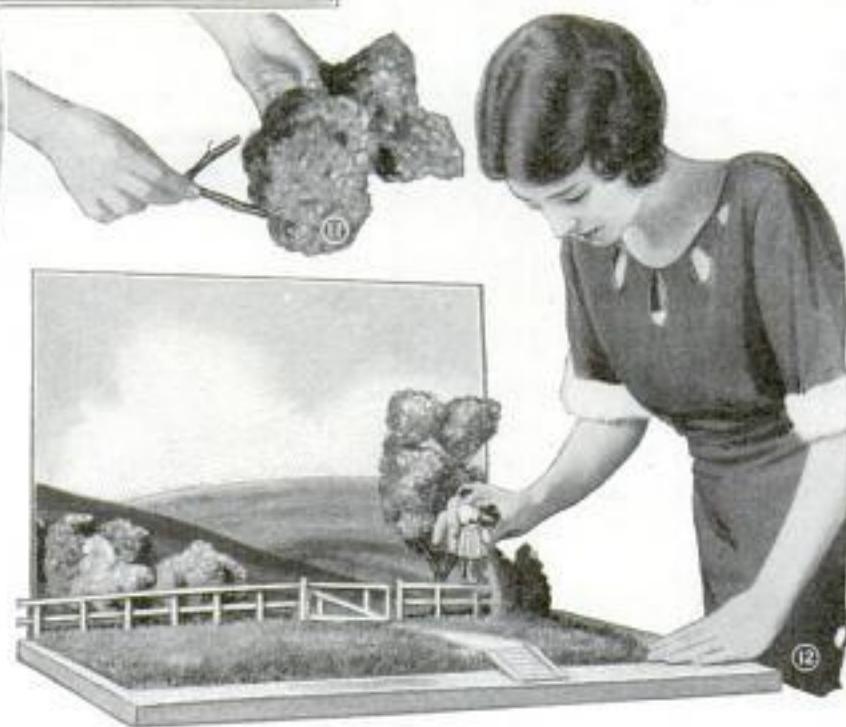
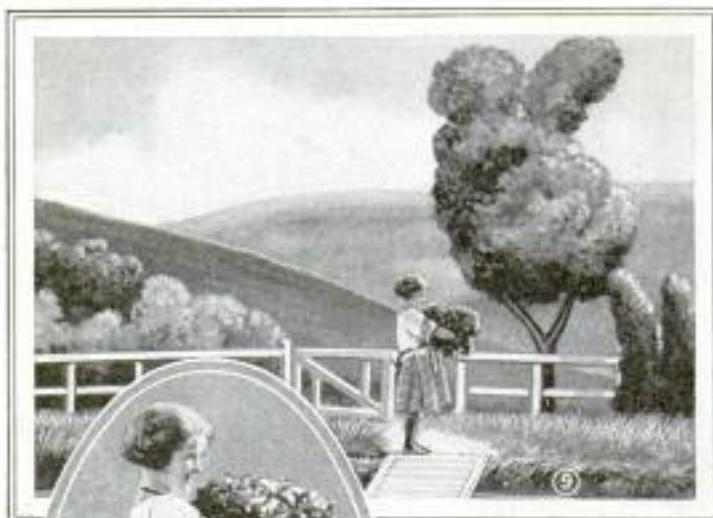


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Land Scenes as Well as Seascapes Can Be
Imitated with Surprising Realism



cigaret is fastened. The tip of a pencil, slightly blunted, painted black and touched up with white chalk, is held on top of the cigarette with a thumbtack. A railing can be placed around the tower by using needle ends, bringing a bit of black thread all around, as shown in the detail, Fig. 8.

Perhaps the easiest kind of picture to take in miniature is an imitation of a snow scene, as in Figs. 5 and 6. Any white material may be used for the snow, such as fine salt, powdered sugar or flour. Small hills can be made by merely heaping up the material and modeling ravines and broken slopes with a sharp pencil. A brilliant side lighting can be used to give the effect of sunrise or sunset, and clouds can be printed in from a cloud negative or obtained by means of a roughly painted background. Mountain ranges can be made by using a few sharp-angled pieces of coal or fragments of broken stone, sifting the white powder on these in a

close imitation of nature. The fencing shown in Fig. 6 was built up from small twigs, gradually diminishing the size of the posts in order to give the picture the proper perspective. The deposit of snow on the railings was faked with narrow strips of cotton batting, lightly sprinkled with powdered sugar. The foliage in the background was made from short twigs set into a slope covered with cotton batting. If it is desired to make the scene an actual snowfall, the effect can be

obtained by daubing the flakes on a sheet of glass and interposing this between the set and the camera. This would give a gentle diffusion to the whole picture. While none of the pictures shown in this article have been softened, better pictorial studies can be obtained if the whole picture is more or less toned down. This can be done by using a regular diffusion disk, which you can procure at any camera store, or by covering the lens with a piece of fine-mesh cloth or screen.

Table-top photography is a practical art as well as an entertaining pastime. The same principles, on a much larger scale, are used by professional and amateur movie makers in fashioning sets for difficult-to-get or unusual pictures. Great-

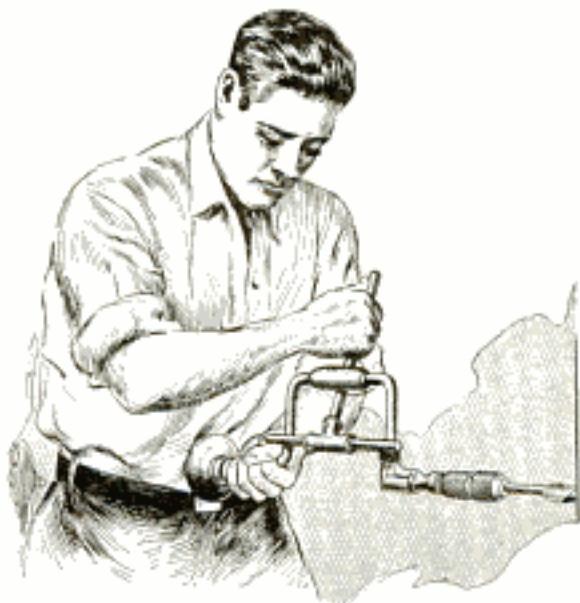
er care, of course, must be used in the making of miniature scenes, as any imperfection immediately brands them as artificial and spoils the whole effect. The same exactness is demanded in the construction of model homes and buildings when these are to be presented as a true picture of the finished job.

The introduction of figures widens the scope of these table-top mounts. You can easily work your own picture into any set by cutting it from an old snapshot, mounting it on cardboard and resetting it amid new scenery, as shown in Figs. 9, 19, and 11. Thus, without setting foot outside your own state, you can furnish photographic proof that you have scaled the mighty Alps, shot lions in Africa and "mashed it" in Alaska. Some attention must be given the proportions, of course, in order that you may not seem to tower above the Alps nor shoot at a lion as big as an elephant.

Tissue-Paper Pulp Stops Leaks in Radiator

An emergency repair on a honeycomb radiator can be made with moistened tissue paper. Tear the paper into small pieces and soak it in water to form a pulp of the consistency of putty. Force a small amount of this tightly into the perforation where the water leaks until it comes flush with the front and back of the radiator. If the leak is about halfway between the front and back, the pulp should be forced about $\frac{1}{2}$ in. past the leak from the back, and then filled up bit by bit until flush with the front. This method will stop the leak immediately.

Extension Handle Increases Leverage of the Brace



Leverage of Brace Increased by Using Extension Handle When Drilling in Hardwood with Large Auger

Made of pipe and fittings, this handle will be useful when drilling large holes in hardwood with an ordinary brace and auger. It consists of a 12-in. length of $\frac{1}{2}$ -in. pipe fitted with a tee and two short nipples. In use, the drill is started and then the handle placed on the brace as shown, to obtain more leverage. Of course, care should be taken not to bend the brace.

Money for YOUR Ideas

EVERYBODY is an inventor because everybody has at some time or other thought of a time, labor or money-saving short-cut which would help others if they only knew about it.

Such ideas, trivial though they may seem to you, are interesting and helpful to others, and so we are offering three special awards each month for ideas that will help the autoist, the home craftsman and the shop worker.

All ideas used will be paid for at our regular rates and, in addition, there will be three prizes of \$25 each for the best ideas submitted.

Send your ideas to the Shop Notes editor, with a small sketch or photograph to make them clear, if necessary.

Ink for Writing on Celluloid

When it is desired to write on celluloid articles, such as draftsmen's triangles, it can be done by dipping the pen in acetic acid and using it as ink. Writing done with this acid will, when dry, have a dull appearance on the surface of the celluloid. Such ink may be colored by adding pigment.



Weighted Bucket Serves as Anchor and Allows Boat to Drift Slowly While Casting

Anchor Lets Boat Drift Slowly While Casting

When fishing alone from a boat which should be kept in motion while casting, provide a dragging anchor to allow the boat to drift slowly. A bucket filled with sand or rocks will serve the purpose. It is tied to a length of rope, which should be knotted at regular intervals so that it can be held at various heights by means of a notched board projecting over the edge of the boat as shown. When still-fishing, a holder for your rod can be made by cutting and bending a length of flat iron to the shape shown in the detail and fastening it to a seat with a bolt and wingnut, leaving both hands free for another rod.—Addison Bain, Marion, Ohio.

How to Grow Healthy Trees

By carefully observing the following rules, one should not experience any difficulties in growing healthy trees, provided, of course, good nursery stock is used. The first step is to keep the exposed roots covered with a damp sack or cloth until the trees are planted. Remove at least one-third of the branches to avoid crowding, and cut off all broken roots. Cut a cleft, deep enough to pierce the bark,

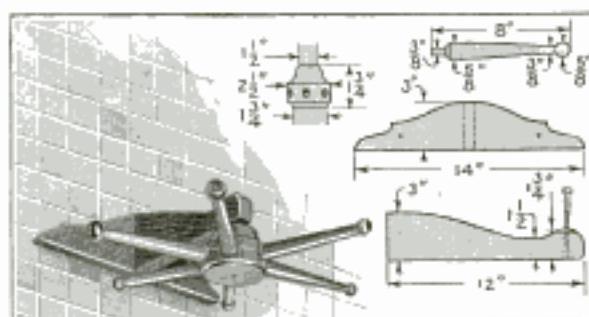
along the side of the trunk, starting at a point just below the surface of the ground as it will be when the tree is planted. Dig the hole large enough to avoid crowding or bending the roots, after which rich black loam is tamped firmly, but not too tightly, around the roots. Also spread plenty of top soil around the tree so that after settling the surface will be level.—Jos. M. Creamer, Astoria, N. Y.

Rust-Proof Nails for Roofing

Nails often rust off, allowing the roofing material to become loose long before it has worn out. This trouble can be prevented by using rust-proof nails when laying the roof. Another important factor in preserving a roof is to use the correct size of nails. Five-penny nails are best for two layers of wood shingles, while three-penny nails are better for one layer. Cut shingle nails are considered to be the best for wood shingles, while large-head roofing nails are preferable for composition shingles or roll roofing, as the large heads prevent leaks around the nails.

This Revolving Towel Rack
Takes Little Space

Easily attached to the bathroom or kitchen wall, this revolving towel rack has greater capacity than a rack of the usual type. It consists of a wooden bracket holding a hub to which pegs are attached, all details and sizes of the parts being given in the accompanying drawing. The bracket is drilled to receive a screw which revolves freely in the hole, but is driven into the hub to hold it in place. The hub should be of such depth



Revolving Towel Rack Suspended from Bracket Arms Occupies Little Space and Has Large Capacity

that the pegs will not hit the bracket when turned.

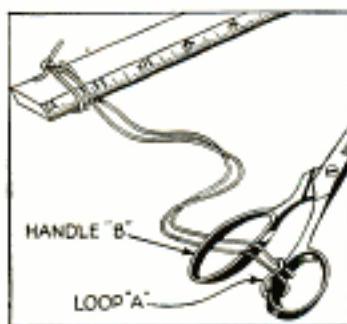
Boiled Water Keeps Roses Fresh

Cut flowers placed in water that has been boiled will remain fresh longer than if placed in ordinary water. This is especially true in cities where the water is purified with chlorine. At flower shows held in Cincinnati and Chicago, it was discovered that roses lasted four days at the former city, while they only lasted twenty-four hours in the latter, due to the high chlorine content in the water supply.

Bottles Cleaned with Brass Chain

Bottles can be cleaned with a 2 or 3-ft. length of small-size brass furnace chain. Half fill the bottle with warm, soapy water, drop the chain inside and shake until all the dirt has been loosened, holding your thumb over the mouth or closing it with a cork. This is better than using shot, as the chain is more easily handled.

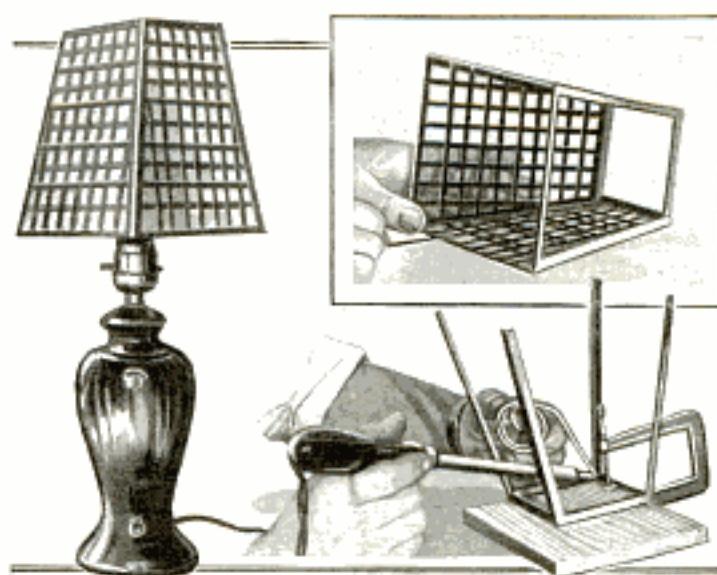
Scissors-and-Twine Puzzle Is a Teaser



looping it over one handle and then tying the ends to a ruler or other suitable object. The idea is to remove the scissors without cutting or breaking the twine. To do this, take the loop A and run it through the scissor handle B, bringing it up over the point of the scissors. The twine can then be pulled out of the handle.

We Beg Your Pardon

The grasshopper toy, described on page 1008 of our June issue, we find, is patented by the Hubley Manufacturing Company, Lancaster, Pa. Therefore, the making of this toy would be an infringement.



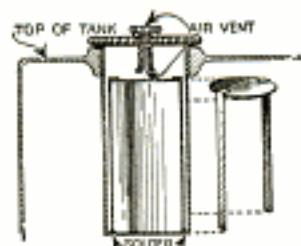
Lamp Shade Made from Strips of Nickelplated Zinc Woven Together and Backed with Pieces of Colored Silk

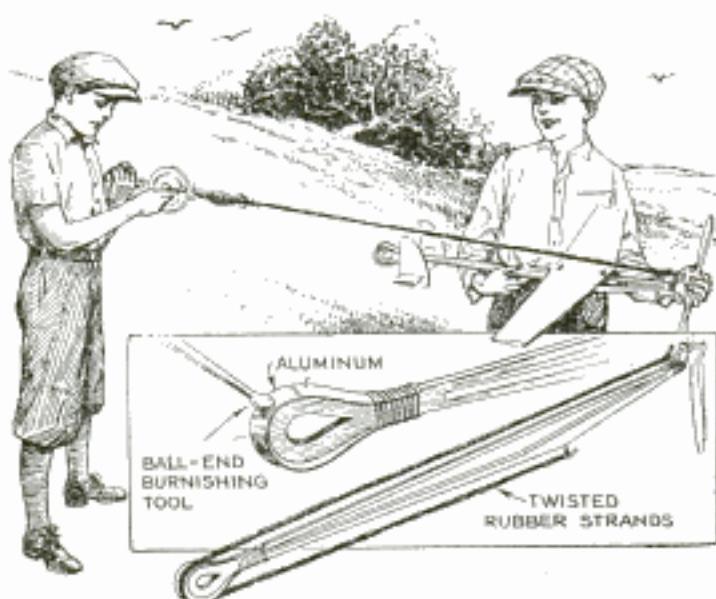
Lamp Shades Woven from Strips of Nickelplated Zinc

The illustrated lamp shade was made from strips of nickelplated zinc, $\frac{3}{16}$ in. wide, woven on a frame of zinc strips soldered together at right angles. The horizontal strips are evenly spaced and soldered to the frame, after which the vertical strips are woven between them and also soldered at the ends. Care should be taken in the spacing so that the effect is uniform throughout. The shade may be lined with colored silk and fitted with wire loops for clamping it over a light bulb, or a socket may be attached if it is to be used on a bridge lamp.

Tin Disk Prevents Oil Splashing over Outboard Motor

Splashing of oil through the air vent on the gas tank of an outboard motor can be prevented by placing a tin disk inside the filler cup as shown. The disk is soldered to two small strips of sheet metal, and these are in turn soldered to the bottom of the filler cup. This arrangement does not interfere in any way with the filling of the tank or the action of the air vent.





Unusually Long Rubber-Band Motor Looped over Polished Thimble Doubles Power of Model Airplane

Doubling Power of Rubber Motor on Model Airplane

The power of model airplanes can be practically doubled by using longer strands of rubber, looping them over an aluminum thimble at the tail and fastening the free end to a screw eye driven into the underside of the fuselage near the propeller. It has been found that such a motor, wound to approximately 3,000 turns with the use of a winder, will turn a 15-in. propeller for fully 5 minutes, depending, of course, upon the length of the fuselage. The thimble is merely a strip of .005-in. sheet aluminum, bent around the curved end of the fuselage and pressed into a groove, previously cut in the curved end, by means of a ball-end burnishing tool, the ends of the aluminum strip being securely tied as indicated. In forming the groove, an even pressure is necessary to prevent the formation of humps and hollows which ruin the job. Be sure that the sharp edges of the aluminum are smoothed so that no burrs are left to cut the rubber. Where the rubber comes in contact with the thimble, apply a copious amount of graphite to eliminate friction. The effect of this arrangement is the same as that of an ordinary rubber-band motor of twice the usual length. As the tension is equal on both sides of the fuselage, vertical bending is practically eliminated, which is an advantage over the conventional type. Side bending can be prevent-

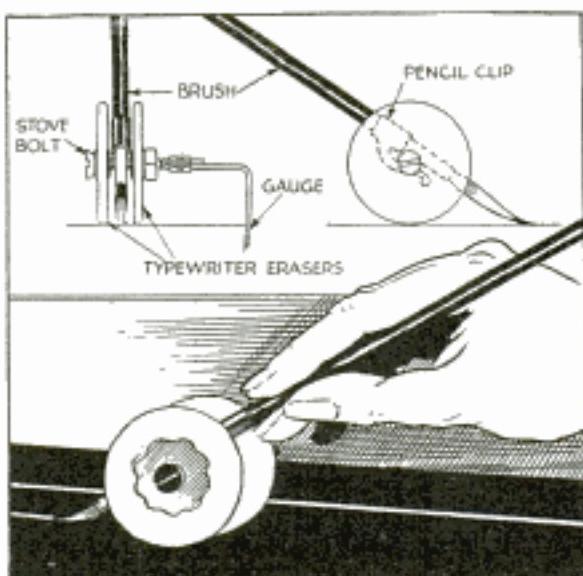
ed by sawing a $\frac{1}{8}$ -in. slot through the center of the fuselage the greater part of its length, and gluing in a reinforcing crosspiece of $\frac{1}{8}$ -in. balsa the entire length of the slot. With this type of motor, the rudder cannot be attached along the center of the fuselage and therefore two rudders must be provided, as shown. It is also essential to have the thimble highly polished.

Color Filter for Your Camera

Colored cellophane will provide a filter for your camera that will work as well as the more expensive ones. This material can be purchased from any chemical-supply house. The cellophane may be held directly in front of the lens in the usual way, or a wooden or metal frame may be made for it, in which case the frame should fit snugly on the lens.

Brush Rest Aids in Striping

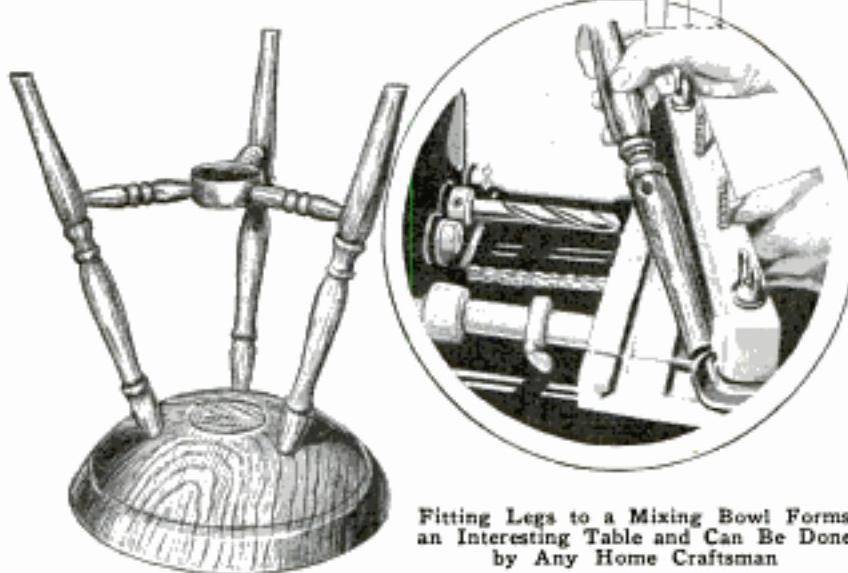
Striping can be done easily by anyone with the aid of a simple brush rest made from circular typewriter erasers, pinned together with a stove bolt. An ordinary pencil clip holds the brush in place, while a guide can be provided by bending a short wire at right angles and attaching it to the end of the stove bolt by means of a small collar fitted with a setscrew.



Anyone Can Do Striping Accurately with the Use of This "Rubber-Tired" Brush Rest

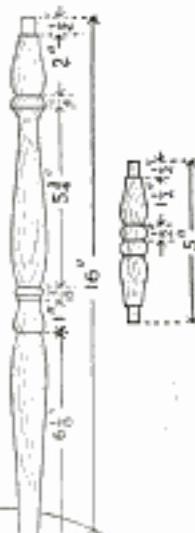
Early American Bowl Table Has Many Uses

Reminiscent of early America, this three-legged bowl table is useful for holding almost anything from magazines to growing plants. Its construction is both easy and inexpensive, and it can be made by anyone having access to a wood lathe. The top is a wooden mixing bowl, obtainable from any hardware or house-furnishing store for \$1 or so, depending on size. Usually these bowls are of maple, thoroughly waxed. Therefore, the legs and cross rungs should be of the same material, although birch, gum or poplar can be used without detracting appreciably from the appearance. For a 13-in. bowl,



Fitting Legs to a Mixing Bowl Forms an Interesting Table and Can Be Done by Any Home Craftsman

enough material for the legs and other pieces is contained in a board measuring 22 by 6 by $1\frac{1}{4}$ in. After a 3 by 3-in. block has been cut from this piece, rip the remainder into strips, $1\frac{1}{4}$ in. square. Cut these about 2 in. longer than the finished legs and rungs and mark the centers so that they can be set up in a lathe for turning. The center block, into which the three rungs are fastened, is turned on a small faceplate. Of course, the size of the bowl will determine the dimensions of the legs and other parts. The board mentioned provides material for converting a 13-in. bowl into a table 18 in. high. Exact dimensions of the parts for this are given in the detail. In assembling, use glue and small brads. The design turned into the legs and rungs need not be a replica of that illustrated, but should be of

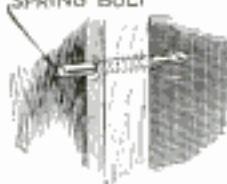


colonial type. After each piece has been turned to shape, give it two applications of wax and polish it while still between the lathe centers, but do not wax the ends that are to be glued. The wood is left in its natural color, save for whatever slight change the wax may produce. Holes in the bowl bottom, legs and center block for the legs and cross rungs, can

be bored by any conventional means, at the proper angle. The center insert shows this being done on a home-workshop machine having a boring attachment.

Spring Bolts Hold Screens in Window Frame

For holding screens in place, the use of window spring bolts is superior to the usual methods. A hole to receive the bolt is drilled in the center of each side of the screen frame, and corresponding holes are then drilled in the window casing. This method is especially convenient when putting up screens above the first floor, as the job can be done from the inside.



Footrest for Coach-Model Cars

Length of Pipe Forms Comfortable Footrest and Prevents Passengers from Soiling Front Seat

The annoyance of having the back of front seats in coach-model cars soiled by passengers in the rear, can be reduced by providing a foottrail. It is bent to shape from a suitable length of pipe with the ends flattened and drilled for screws, by which it is fastened.—Myron L. Harmon, South Bend, Ind.

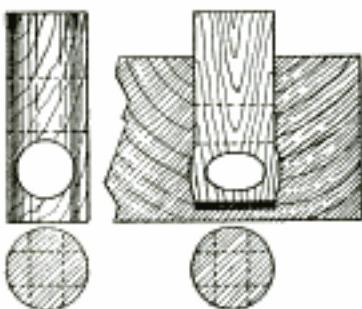
Draining Sink Water Quickly

When water drains slowly from your bathtub or sink, try whirling it. Move your hand around in the water above the drain hole. After the water starts to whirl you will find that it drains much faster than in the ordinary way.—Joseph Minarovitch, Berwyn, Ill.

Dowels Anchored Securely

A dowel can be anchored securely as follows: Drill two holes through the lower end at right angles to each other, as indicated by the dotted lines in the drawing. The dowel should be an easy fit

in the hole, and after it has been inserted, a few taps with a hammer will cause the walls of the drilled portion to bulge



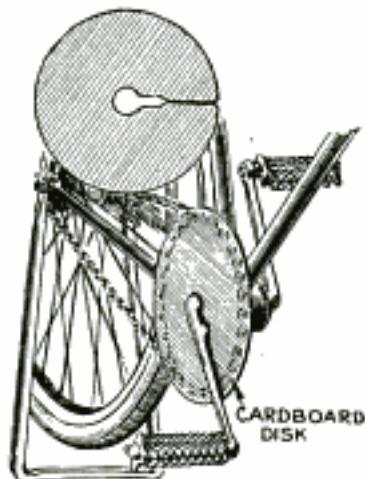
and thus anchor the dowel securely. Glue should, of course, be applied before it is inserted.—Sherwood J. Gee, Salt Lake City, Utah.

Die for Forming Model-Ship Deadeyes and Capstans

Deadeyes and capstans can easily be made by using a die cut from brass or similar material, and stamping them out of hard rubber or old phonograph records. Heat the die and the rubber in boiling water, which softens the latter so that it can be cut more easily. The die may be conveniently used by making the parts in the form of a hinge, and applying pressure in an arbor-press or vise. This method is useful also for making other small articles of this nature.

Cardboard Disk on Bicycle Sprocket Protects Trousers

A heavy cardboard disk, slightly larger than the sprocket wheel of a bicycle, can be used as a guard for trouser cuffs. A slot is cut in the disk as shown in the detail so that it can be slipped over the pedal crank on which it should fit snugly. This is an excellent emergency measure when the regular trouser guards have been mislaid or forgotten.

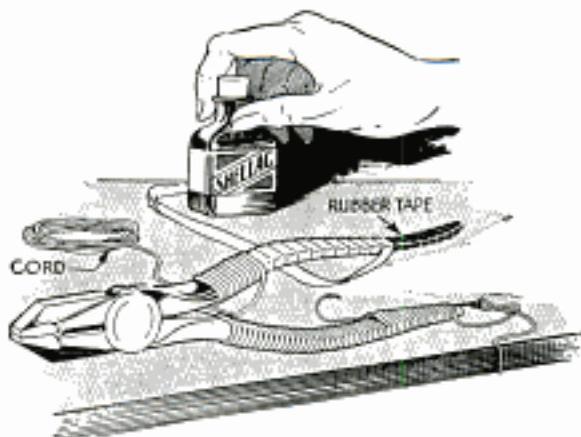
**How to Eradicate Insects around the Home**

Insects around the home, such as roaches, ants, croton bugs and bedbugs, can be destroyed by using a solution of alum, 2 lb., dissolved in 3 or 4 qt. of water. Heat this solution to the boiling point and apply it to the cracks and crevices with a brush, where the insects are likely to be. Moths can be kept out of woolens and furs by wrapping them in heavy paper that is free of holes, making

sure, of course, that the garments are free of moths before wrapping them. Cedar wood, gum camphor, tobacco leaves or anything that is strongly aromatic should be put in the pockets previously. Another method of keeping moths away is to wrap the garments in a piece of linen and put pieces of blotting paper inside the wrapping, which has been saturated with a solution of alcohol, $\frac{1}{2}$ pt., turpentine, $\frac{1}{2}$ pt., and camphor, 2 oz. This solution can be kept for some time if placed in a bottle, shaking well before using.

Insulating Electricians' Pliers

Electricians' pliers can be insulated and furnished with a comfortable grip by wrapping the handles with rubber and friction tape, and cord. The rubber tape is applied first, stretching it tight, and then two layers of friction tape, starting the first layer at the jaw end of the handle and doubling the second back from the other end. Then dip the handles in shellac and allow them to dry until tacky. Next lay 3 in. of medium-size fishline along the inside of the handle toward the jaws, making one turn on the metal of the handle, and continue the wrapping up to 1 in. from the end of the handles. Lay a piece of wire, with an eye bent at one end, upon the section not yet covered with line and wrap around it, as shown in the drawing. When the remaining space has been covered, loop the cord through the eye of the wire and draw up the previous turns. Then work the turns tight before cutting the line. Three or four dips, allowing the shellac to dry between dips, complete the job.



Wrapping of Tape and Fishline Insulates Electricians' Pliers and Forms Comfortable Grip

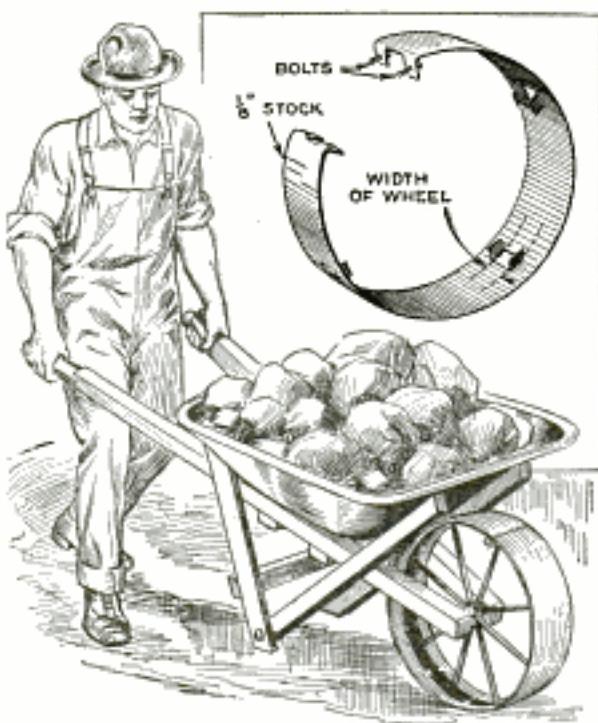


Tree-Climbing in Orchards Ended by Barbed-Wire Wrapping

Barbed wire wrapped around the trunk of fruit trees will prevent tree climbing in your orchard. The wire should be wrapped loosely to allow for the growth and expansion of the trees. Limbs that hang near the ground can be raised out of reach and held by means of wires run through two short lengths of rubber hose, one of which straddles the trunk and the other the hanging branch.—Andrew Vena, New York City.

Paraffin Prevents Fingerprints on Piano Keys

Spread over piano keys, a thin coating of paraffin will keep them from becoming quickly soiled with fingerprints. After the keys have been cleaned and allowed to dry, melt the paraffin and apply it to the keys with a small camel's-hair brush. Care should be taken not to get the paraffin between the keys, as it may cause them to stick when playing.—Lieut. D. B. Owens, Jr., Dayton, Ohio.



Wide Sheet-Metal Band around Barrow Wheel Aids in Wheeling over Soft Ground

Sheet-Metal Tire on Barrow for Soft Ground

Provided with this wide sheet-metal band around the wheel, a wheelbarrow can easily be pushed over soft ground. The band is held together at the ends by means of two stove bolts, while tabs, formed by cutting slits in the band at regular intervals, keep it from slipping sideways.

Flashlight Photos Can Be Made with Magnesium Ribbon

Magnesium ribbon, tightly rolled and kept in a small cylindrical container in your camera case, will be found useful for taking flashlight photos when regular equipment is not at hand. The ribbon, when ignited, will provide sufficient light, but the exposure should be longer than usual and motion must be avoided.

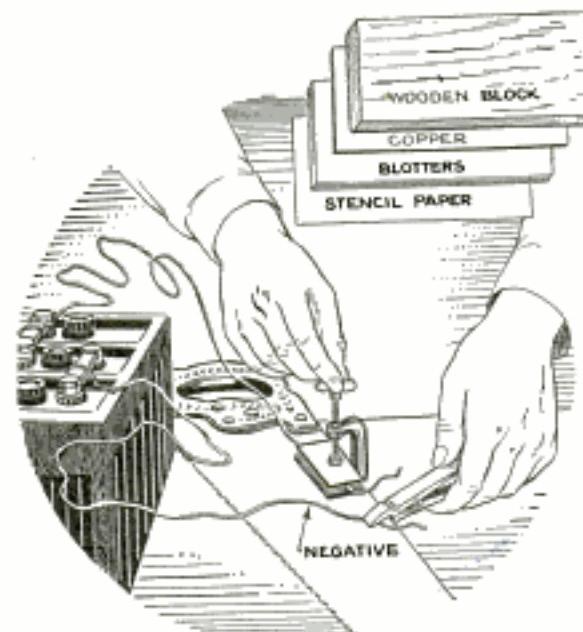
Chains for Model Ships Crocheted with Heavy Thread

Where it will not be subjected to strain, a good imitation chain for model ships can be made by crocheting heavy thread in a "chain" with loops of the required size. When completed, it is rubbed with beeswax and quickly passed over a flame to melt the wax into the fibers, after

which aluminum paint is brushed on rapidly. When the paint is dry, dry-brush with black japan, letting some of the aluminum show through. The effect is a very credible iron chain.

Names and Designs Applied to Tools by Electroplating

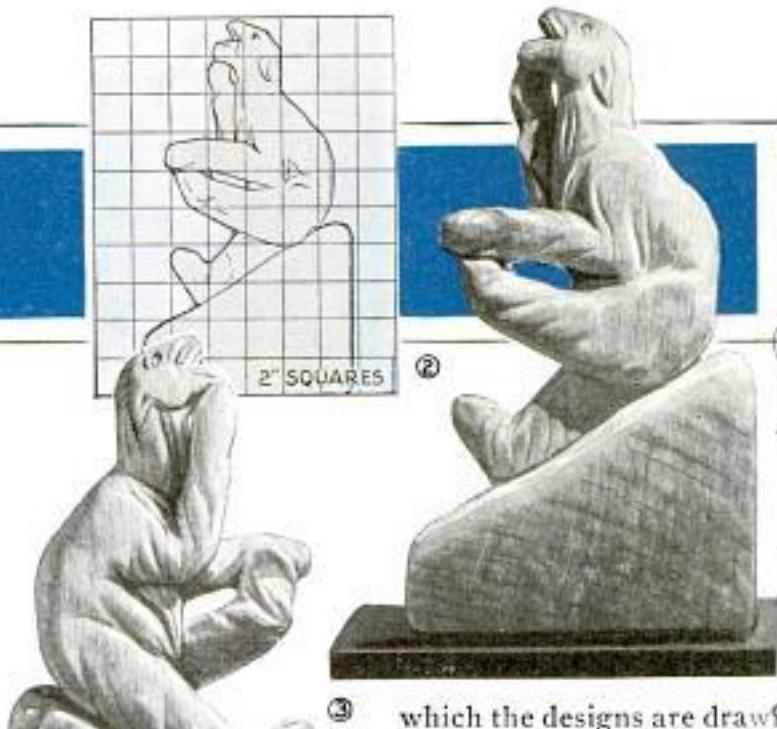
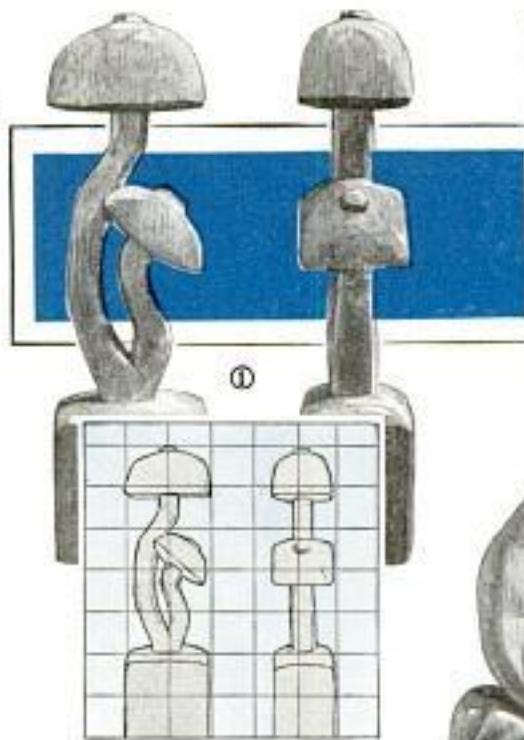
Any name or design can be put on tools or other metal surfaces by means of a simple electroplating process. Get a piece of mimeograph-stencil paper and cut the desired design on it. Then soak two pieces of heavy blotting paper, of the same size as the stencil paper, in a strong solution of copper sulphate and water. Place the blotters on the stencil paper, which is placed on the tool. A sheet of copper is put over the blotters and a wooden block on the copper. Place the bare end of the positive wire from a 6-volt storage battery between the copper plate and the wooden block to make electrical contact with the former. The block insulates the wire from the C-clamp, which is used to hold the assembly tightly on the tool. Be sure that neither the positive wire nor the C-clamp touch the tool, as this would result in a short circuit. Next fasten the negative wire from the battery to the tool with a small clamp or clip. After 5 or 10 minutes, the design will show on the tool



Lettering and Designs Can Be Put on Tools or Other Metal Surfaces with Copper Sulphate

in bright copper color, which cannot easily be removed.

Pocketknife Carving in Balsa Wood

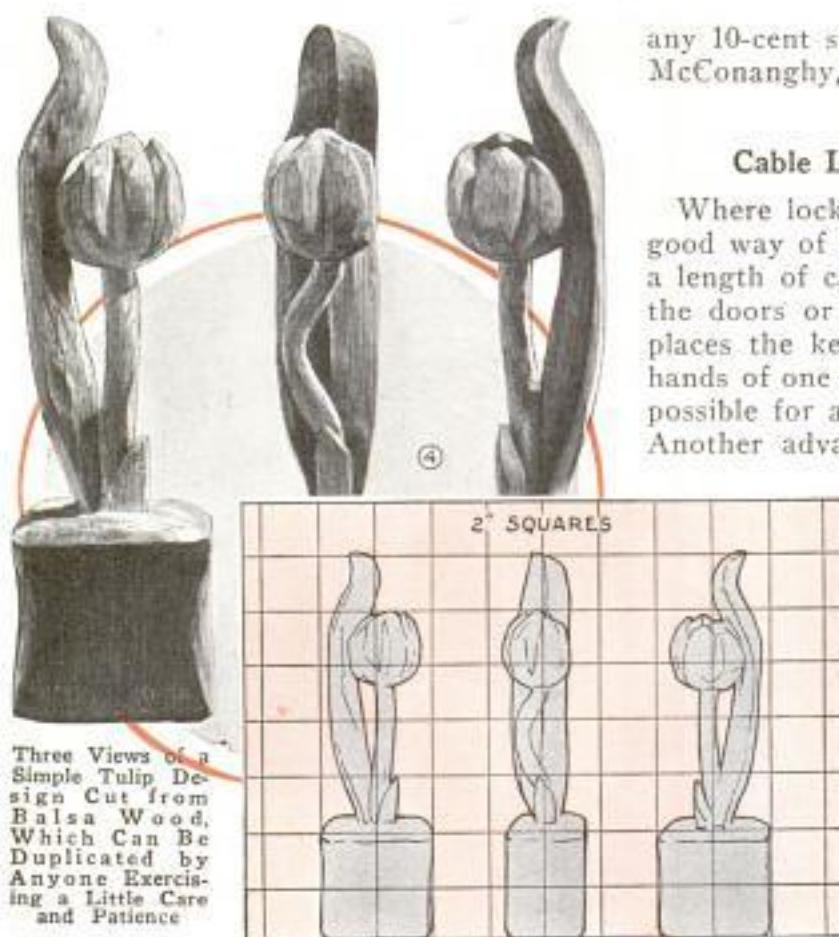


With very little practice anyone can produce beautiful carvings in balsa wood, leaving a bold, rough finish, or sanding down the harsh edges to a greater degree of fineness, as desired. The feature that especially makes this kind of carving easy is that the wood is extremely soft and can be cut with a razor or sharp pocketknife. It is advisable, however, to get a 25-cent fret-saw for removing large waste portions before the finishing cuts are made. As a preparation to actual carving in wood, it is a good idea for the beginner to experiment with cutting in soap in order to get the necessary sense of direction. The cut soap is not wasted but can be handily used. Profile pictures of anything that strikes your fancy can be obtained from magazines and newspapers, or if you have talent in sketching, it is a simple matter to produce original and distinctive designs. The three suggestions given here form excellent projects. A template is first prepared by ruling off a sheet of paper in 1 or 2-in. squares, after

which the designs are drawn in and traced onto the work. The polar bear, mounted on a huge cake of ice, is especially interesting. Figs. 2 and 3 show the two sides. From the shadows in the photos, the depth of the cuts can be determined with reasonable accuracy. The block of wood from which this specimen was cut was approximately 3 in. thick, 20 in. high and 12 in. wide, but it can be carved from a block just one-half of this size, using 1-in. squares in

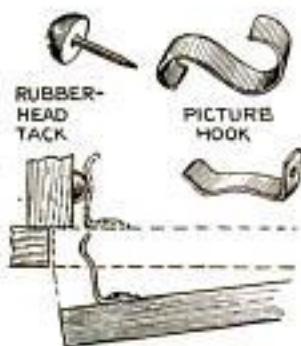
the template. You will note that the portion representing the ice cake, is left rough, especially at the bottom, the original saw marks being plainly visible. If desired, this part may be cut off in haphazard manner to give it a more realistic appearance. If the object is quite high, it is advisable to screw on an additional base of hardwood to give greater rigidity and to prevent it from being accidentally upset, which would probably mean breakage. Two other examples of good projects for beginners are the toadstool in Fig. 1 and the tulip in Fig. 4. Both side and front views of the former are given,

Monteith G. Lewis Jr. New York
210 Lewis St. New York



while the appearance of the other side is the reverse, and that of the back quite obvious. In case of the tulip, three sides have been given so that you will have no difficulty in executing it. One point to remember when laying out the design on a piece of wood is to have the grain run so that there will be no narrow projections across the grain. These necessarily would be weak and likely to break off easily. However, if such a mishap occurs, the broken piece can usually be glued on so that the break is almost invisible.

Door Snubbers Made from Picture Hook and Tack



Snubbers for cabinet doors can be made from an ordinary picture hook bent to the shape shown, and a rubber-headed tack, which is used as a catch for the snubber. The material can be bought at

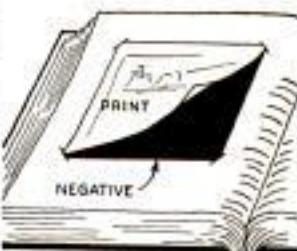
any 10-cent store if not on hand.—H. L. McConanghy, West Orange, N. J.

Cable Locks Series of Doors

Where lockers are arranged in rows a good way of locking the doors is to pass a length of cable through the staples on the doors or locker stiles. This method places the key to all the lockers in the hands of one individual and makes it impossible for anyone to pilfer the lockers. Another advantage is that it eliminates the often recurring trouble of lost keys, where so many different keys and locks must be handled. As a means of locking the end of the cable without altering its size so that it will pass through the staples, a simple clamp can be made from spring steel. The piece is doubled and an eye is formed at the doubled end to fit the cable, so that, when pinched together and held in this position with a padlock, the clamp cannot be removed. Two holes drilled through both ends of the clamp allow attachment of the lock.

Album Files Photo Negatives

When putting your snapshots or photos in an album, it is a good idea to place the negative in first and put the print over it as shown. The print protects the negative from injury and you can readily find any negative by looking at the prints.

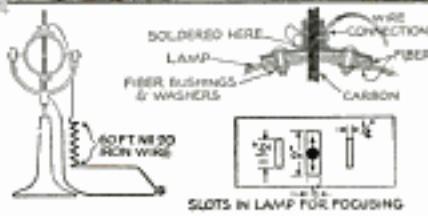
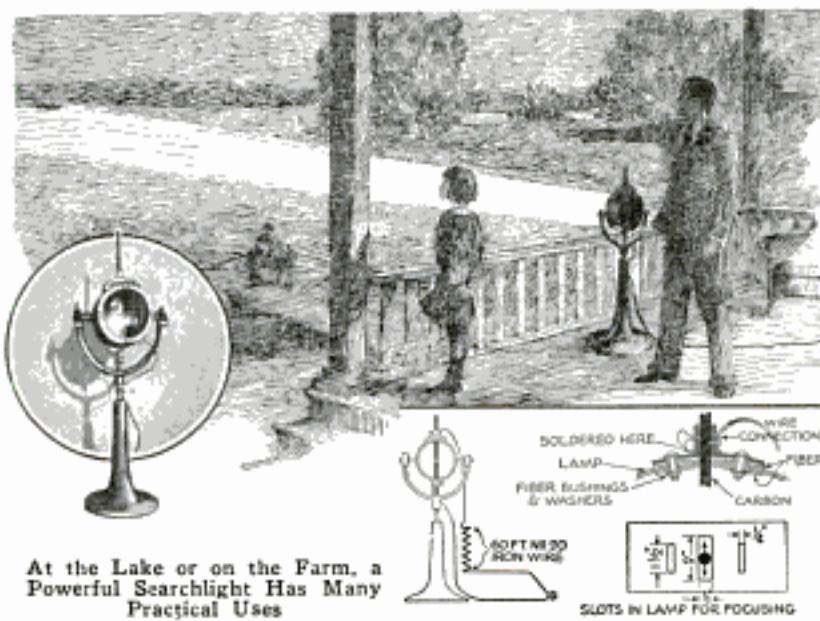


Rubber Hose Stops Rattle of Auto Hood

Most of the rattling around the front of my car came from the hood at the four points where it was clamped. By slipping a piece of hose between the hood and each fastener, the rattle was completely eliminated.—J. T. Temple, Cactus, Ariz.

Arc Searchlight Throws a Four-Mile Beam

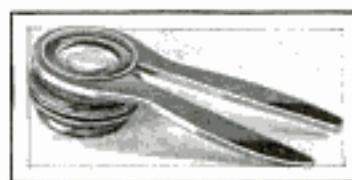
Throwing a white beam of light for four miles, this searchlight consists of an old gas-type auto headlight fitted with carbons connected in series to a suitable resistor, and operates on 110-volt current. The lens should be removed to provide sufficient ventilation. A hole is cut in both top and bottom to take the carbons. The carbon holders are made from 4-in. lengths of $\frac{1}{8}$ -in. flat iron, 1 in. wide and bent to conform to the curvature of the lamp. A $1\frac{1}{2}$ -in. length of brass tubing, of $\frac{1}{2}$ in. inside diameter, is soldered or brazed over a $\frac{1}{2}$ -in. hole drilled in the center of each holder, after which the latter is attached to the lamp. This is done by drilling two holes for screws through both the holder and the lamp, and through two fiber insulating strips of the same width and length as the holder. Fiber bushings are slipped through the holes in the lamp and through the strips, whereupon the holder is set in place and the entire assembly securely fastened with bolts passing through the fiber bushings. They must not touch the lamp. As the focusing of the light depends on the distance between the carbons and the reflector, the holes in the lamp should be elongated to form slots, so that the holders can be moved back and forth. Also, a hole is drilled and tapped in the brass tube of each holder, to receive a thumbscrew, which holds the carbon in position. The resistance needed in the circuit can be obtained by winding 60 ft. of No. 20 soft-iron wire on a piece of porcelain or mica and attaching this to the lamp, taking care that the wire does not come in contact with the latter and that the individual turns do not touch each other. One carbon is wired to the resistor while the other side of the resistor connects to one terminal of a plug. The second carbon connects directly to the other side of the plug. If desired, a heavy-duty switch



can also be cut in the circuit to prevent burning at the plug prongs. When the current is turned on, do not touch both carbons at the same time or you will get a shock. Also avoid touching one carbon and a water pipe or other grounded conductor at the same time. To operate the light, set the carbons so that they touch each other at the center of the lamp and tighten the lower setscrew. Plug in, turn on the switch and start the arc by raising the upper carbon slowly until the flame becomes white, which takes place when the carbons are separated $\frac{1}{8}$ to $\frac{1}{2}$ in. Then tighten the top setscrew and focus the light. When correctly adjusted, it will throw a four-mile beam.—Sanford Marlor, Berkeley, Calif.

Sheet-Metal Wrench Removes Camera Lens

The flange holding a camera lens often corrodes, making it rather difficult to remove the lens without scratching or breaking it. A wrench made of sheet metal, and cut to the shape shown, is useful for this purpose.



The wrench is sufficiently flexible to be expanded and slipped over the lens.

Central Scientific Co.
460 S. Ohio, Chicago



This Portable Wayside Store for Street Venders Can Be Left on the Lot or Taken Home at Night

Vender's Store Resembles Large Wardrobe Trunk

Wayside venders will find this portable store useful, as it can be locked up and left on the lot or taken home at night. The supports are set in holes dug in the ground to prevent the store from falling over. The illustration shows how the wares are displayed in three hinged sections that can be folded and locked.

Smoke Candle Keeps Away Insects

When insects bother you around the camp, try a smoke candle, made by soaking equal parts of pulverized dry leaves and fresh pine sawdust in a strong solution of saltpeter until it is thoroughly saturated, after which it is taken out and dried. Then tamp it into a $\frac{1}{2}$ -in. paper tube. A candle of this kind will burn slowly and produce a smudge that is sure to keep all insects away.—H. Bosshard, Winterthur, Switzerland.

Potato Slicer from Old Plane

Potatoes can be sliced with an old wood plane, by holding it upside down and pushing the potato over the blade as shown in the photo. The thickness of the slices can be regulated by adjusting the blade. This is an excellent meth-



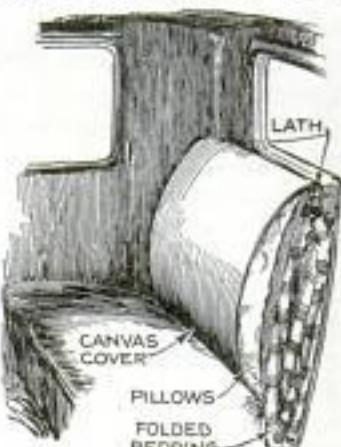
od of preparing potato chips, as the slices can be cut unusually thin. The plane is also handy for slicing soap.

Peppermint Oil Used to Test Drain Pipes

Leaks in drain pipes can be located by using peppermint oil. To do this run enough water into the pipe to fill the traps, then add 3 oz. of peppermint oil to 6 gal. of hot water and pour this into the pipe at the uppermost point of the system, as a sink on the second floor. When doing this keep the door closed tightly and have someone, who has not inhaled the peppermint fumes, follow the course of the pipe through the building. If there is a leak, an odor of peppermint will be detected around it.

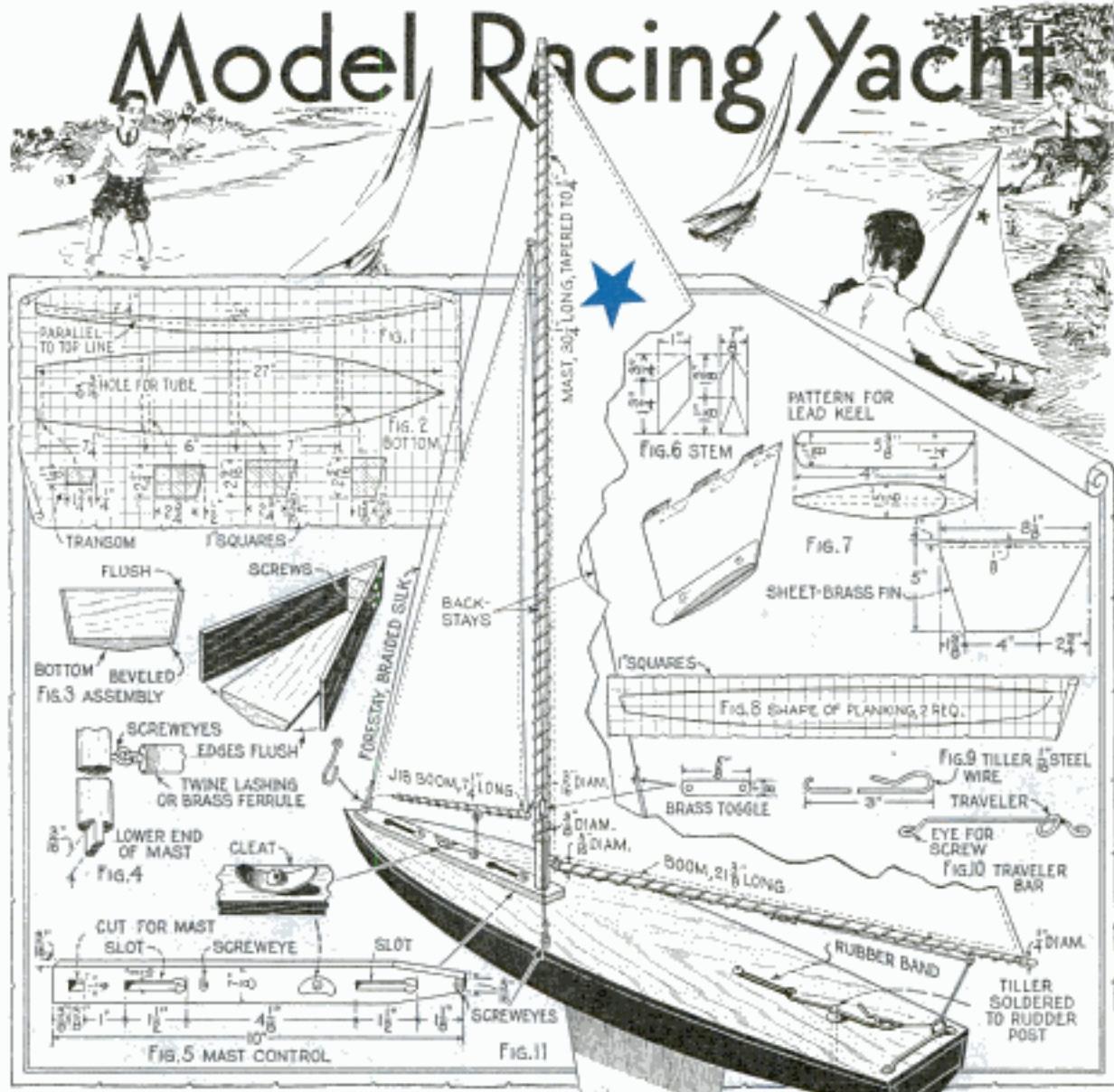
Camp Bedding Stowed Behind Rear Car Seat

Storage space for camp bedding can be obtained by removing the upholstering from the back of the rear seat, which usually only necessitates the removal of a few screws. The bedding is folded into a compact, flat bundle held together with a canvas cover. If the rear seat cushion, too, is removed, still more space will be available.—G. R. Rodgers, Decatur, Ill.



Initials Burned on Golf Clubs

Your initials can easily be burned on the handles of golf clubs, tennis rackets, etc., by means of a copper wire and an electric soldering iron. Twist one end of the wire to form the letter and wrap the other end around the tip of the soldering iron. Then heat the iron and press the wire initial against the handle, and the letter will be neatly burned into it.

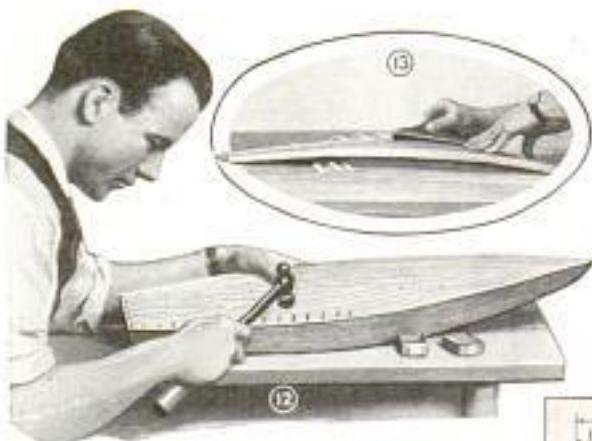


THERE'S as much real fun in building fast model racing yachts as there is sport in sailing them.

First make two full-size patterns for the bottom block, according to the drawings in Figs. 1 and 2, and paste them on adjacent sides of a 2 by 6-in. block of clear-grained white pine, 28 in. long. Cut out the work on a bandsaw if you have one, or with a keyhole saw. Draw a center line along the bottom from the sharp point at the stem to the center of the stern. Take a plane, as in Fig. 13, and working with the grain, cut away the wood on either side of the center line to the dotted line in Fig. 1, so that a cross section of the bottom will be slightly V-shaped. A $\frac{3}{16}$ -in. hole for the rudder post should be drilled at this time, exactly 3 in.

from the stern. The stem, transom and the three molds which determine the shape of the boat are made from $\frac{3}{8}$ -in. stock to the dimensions given in the details below Fig. 2 and in Fig. 6. The stem may be fitted to the bottom board now, making certain that the bottom edges are flush, and then fastening it in place with four $\frac{3}{4}$ -in. brads. The three molds and the transom should be lightly pinned at their proper places, but the nails should not be driven home. It will be necessary to bevel the bottoms of the pieces slightly so that they will stand upright.

Now for the $\frac{1}{4}$ -in. white-pine planks



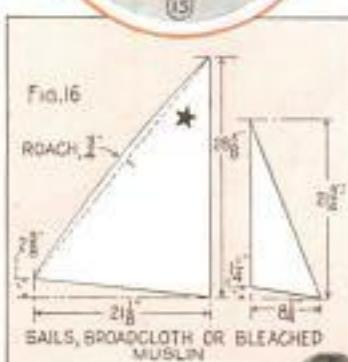
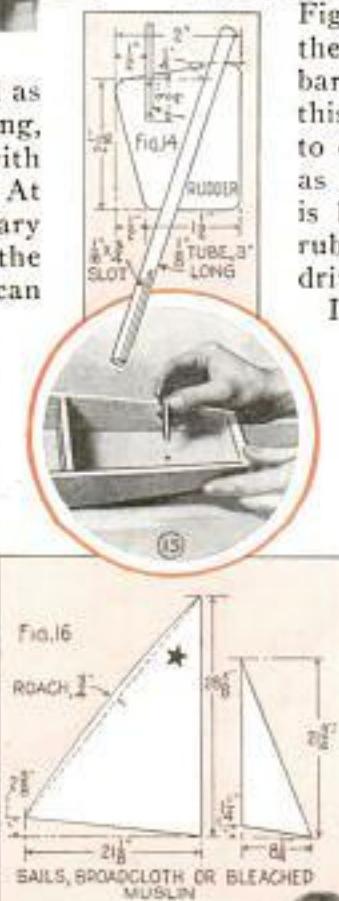
for the sides, each being shaped as shown in Fig. 8. After cutting, attach the planking roughly with a few brads and some string. At the stem, you will find it necessary to make a long bevel so that the pieces will come together, as can be seen in Fig. 3. At the stern, there will be a slight bevel to take the gradual curve of the plank, and all along the bottom block there will be a slight bevel to take care of the outward sweep of the sides. Once the beveling is finished, the planking can be put on permanently. Commence by fastening each plank to the stem with three $\frac{3}{4}$ -in. flat-head brass screws, gradually working toward the stern and fastening the planking with $\frac{5}{8}$ -in. brads at $\frac{1}{4}$ -in. intervals. Three or four nails are also driven into each mold. Then plane away the bottom edge of each plank so that it comes flush with the bottom block, as shown in Fig. 3. Then give the whole interior a coat or two of thin paint, particularly at the joints so that the hull will be watertight. While the paint is still wet, a 2-in. length of $\frac{1}{8}$ -in. (inside diameter) brass tubing is fitted in place to hold the rudder, and forced down through the hole at the stern, as shown in Fig. 15, until the bottom edge comes flush.

Putting on the $\frac{1}{8}$ -in. plywood deck is done by pressing a $7\frac{1}{2}$ by $28\frac{1}{4}$ -in. slab of wood over the hull, penciling around it to get the right shape, sawing it out and then fastening it with $\frac{1}{2}$ -in. brads all along

the sides and crosswise at the transom and at each mold, as shown in Fig. 12. A small hole is cut in the deck to allow the rudder tube to come through flush.

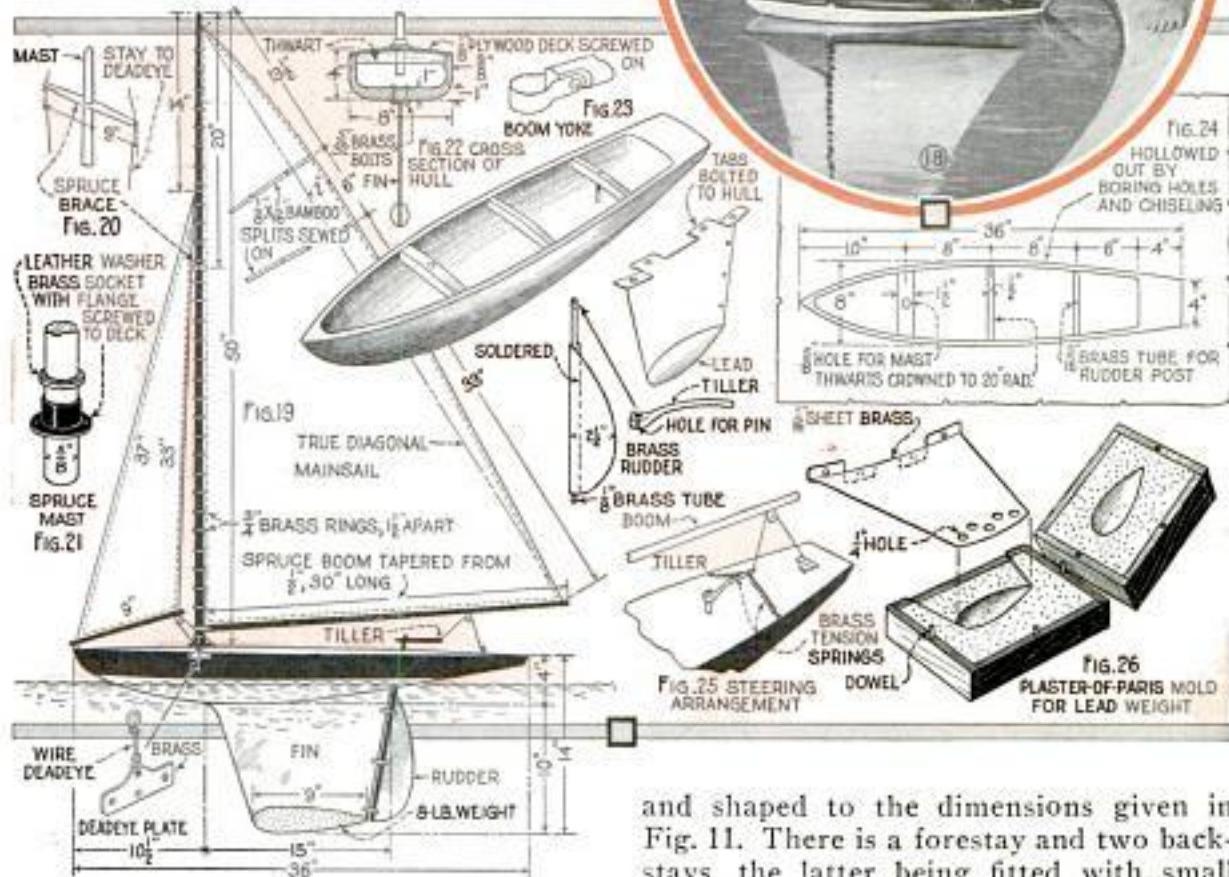
The rudder is fashioned from a sheet of $\frac{1}{32}$ -in. brass and a $\frac{1}{8}$ -in. brass rod, as shown in Fig. 14. The rod should be about 3 in. long so that it will just project $\frac{1}{8}$ in. above the deck when slipped up through the rudder tube. The tiller is shaped from $\frac{1}{16}$ -in. steel wire as shown in Fig. 9, and soldered to the rod at the top of the tube. The traveler bar for the main sheet is made at this time and fastened at the stern to complete the rudder assembly, as in Figs. 10 and 11. The tiller is held at its forward end by a rubber band, slipped over a screw driven into the deck.

In the bow, a mast control is provided, shown in Fig. 5, which allows the mast to be shifted fore and aft, thus insuring the proper balance between hull and sail area. This mast control is made from a piece of $\frac{1}{4}$ -in. hardwood, to the dimensions given, and is fastened by means of two $\frac{3}{4}$ -in. round-head screws, which are driven into the deck just sufficiently to al-



When Rigging a Model Yacht There's Advantage in Having a Sailor Granddaddy

low the control to slide beneath the heads along the two long slots. For the keel weight you will need about $3\frac{1}{2}$ lb. of lead. To get the required shape, first make a wooden form, then fashion a mold from plaster-of-paris and pour the lead into it, casting one-half of the weight at each operation. To do this get a piece of soft white pine, $5\frac{1}{2}$ by $1\frac{1}{2}$ by $1\frac{1}{2}$ in. in size, and on adjacent sides of this paste full-size patterns of the ones shown in Fig. 7. Then fashion the piece on a bandsaw,



making the two cuts indicated by the patterns. After cutting, shape the pieces from top to bottom in a smooth curve, sand them and split down the center, after which a mold is made of each side. About 13 oz. of lead are required for pouring each half of the keel. The two halves, when finished, are bolted to the fin portion of the keel, dimensions of which are also given in Fig. 7. The tabs on the fin are turned over, and the complete assembly is fastened to the underside of the boat, the after edge of the fin exactly 7 in. from the stern.

Masting and rigging come next. The mast and spars are cut from dowel rod,

and shaped to the dimensions given in Fig. 11. There is a forestay and two backstays, the latter being fitted with small toggles so that the lines may be pulled tight or loosened. All rigging lines as well as the jib and main sheets are quite satisfactory if made from braided silk cord. Notice that the sheet line is run from a ring, which slips over the end of the tiller, then through a ring on the traveler, through a block and to a cleat on the underside of the boom.

The sails should be cut from broadcloth or bleached muslin of a good grade to the shapes shown in Fig. 16, with the selvage along the back edge of each sail. While this makes hemming on a sewing machine rather difficult, it is quite necessary to prevent the sails from being stretched out of shape by the wind. The



You Can Just Bet That the Sea Yarns of This Sailmaker Are Thrilling

sails may be cut "raw" and finished with a light coating of shellac around the edges, or the edges may be hemmed by hand after first marking the outline and cutting down to the hem line at several places along the leech (the curved edge) so that the cloth will not wrinkle. In fitting the sails, care must be taken that they fit well and hang properly. After making them, they should be sewed in place. Use white button thread, running it around the spars and through the sails. Do not do this in a haphazard manner, but measure each stitch before you start, and then insert the needle through the markings and as close to the edge of the cloth as can be safely done without tearing the cloth, spacing the stitches $\frac{1}{2}$ in. apart on the mainsail and $\frac{3}{8}$ in. on the jib. The sails may be sewed while the rigging is in place, but a better job is done by removing the mast and spars for the sewing.

Paint the hull up to the deck line in any color, using flat paint or stain. After the color has dried, the whole hull, including the deck and spars, should be given two coats of clear spar varnish. All painting should be done before the sails are fitted.

Sailing the model is quite simple. The mast control enables you to keep the boat on a straight course. If the wind blows

hard, the control should be shifted forward, if lightly, the control moved aft. The force of the wind on the sails will automatically pull the rudder over to the proper angle. When sailing close-hauled, however, the ring may often be removed from the rudder to obtain better results.

A second racing yacht, built in the same general way, but measuring 36 in. in length, is shown in Fig. 18, while the details are shown in Figs. 19 to 26 inclusive. In this case, the hull, Fig. 24, is hollowed out by boring holes and chiseling, and three thwarts, slightly crowned, are fastened across the hull. The deck is then cut out and fitted accurately. The lead keel is poured over the end of the keel fin, making both integral as in Fig. 26, and the fin is bolted to the hull as shown in Fig. 22. In casting the lead weight, a plaster-of-paris mold is poured in a small wooden box, the two halves of which should fit together snugly by using dowels. A recess is allowed for the keel, which is drilled so that the lead will anchor in it securely. Also, the rudder is hinged directly to the keel fin. The tiller in this case is provided with two small brass tension springs, attached to the edges of the deck as shown in Fig. 25, while the tiller is controlled by a line tied to the end, slipped through a screw eye on the boom and then fastened to a cleat on the deck behind the tiller. Instead of making the mast adjustable, it is set into a hole drilled in the center of the forward thwart, while a brass flange is screwed onto the deck directly over the hole to give additional support. Brass rings are used to hold the sail to the mast instead of thread, and a yoke keeps the boom in place on the mast instead of screw eyes, a leather washer, slipped over the mast holding the boom yoke in place. A 9-in. spruce brace, shown in Fig. 20, straddles the mast, 20 in. from the tip, while the stays run from the tip over the ends of the brace, notches being filed for the purpose. The lower ends of the stays are anchored to the edges of the deck by means of wire deadeyes, which are in turn held by small sheet-brass deadeye plates. If you have gone over the construction of the first yacht, it will be an easy matter to build the second by merely following the drawings.

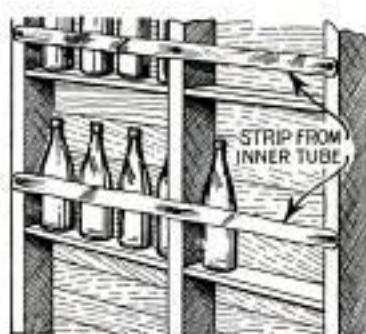
Carpenters' Apron Keeps Bait and Tackle Handy

When fishing in streams where it is sometimes necessary to walk some distance from your car or camp, a carpenters' apron is convenient for carrying fishing supplies, such as a bait can, an extra reel, a pair of pliers, etc. As it is worn at the front, it is easier to get at than coat pockets, and the contents will not drop out.—L. S. Landmichl, Riverton, Wyo.

Rubber-Covered Clothespins Protect Silk Garments

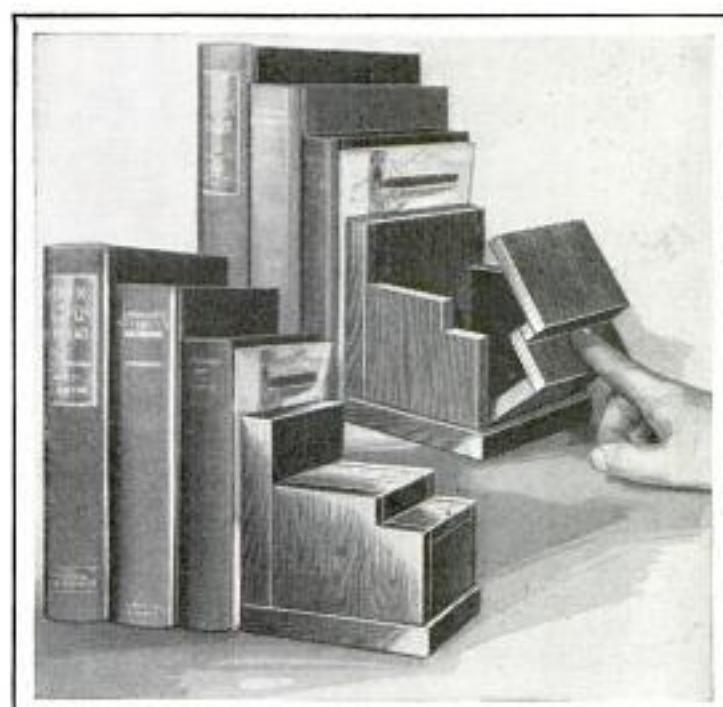
Runs in silk garments, caused by the rough edges on wooden clothespins, can be prevented by covering the prongs of the pins with thin rubber. Get a piece of $\frac{3}{8}$ -in. rubber tubing and cut it into lengths to cover the prongs and slightly project over the ends so that the rough wood will not come in contact with any garment when it is hung on the line. The tubing, being waterproof, can easily be cleaned.

Shelves between Studs for Storage of Beverage Bottles



tween wall studs to hold them. Rubber strips, cut from an old inner tube, are tacked across the studs. In this way the bottles are kept in a safe place and are always accessible when needed.

When running rods through the headings of curtains or drapes, a thimble placed over the end of the rod will prevent it from catching in the fabric and allow the rod to slip through much more easily.



Hollow Book Ends Provide Storage Space for Cigarettes and Matches, or May Serve as Ash Receivers

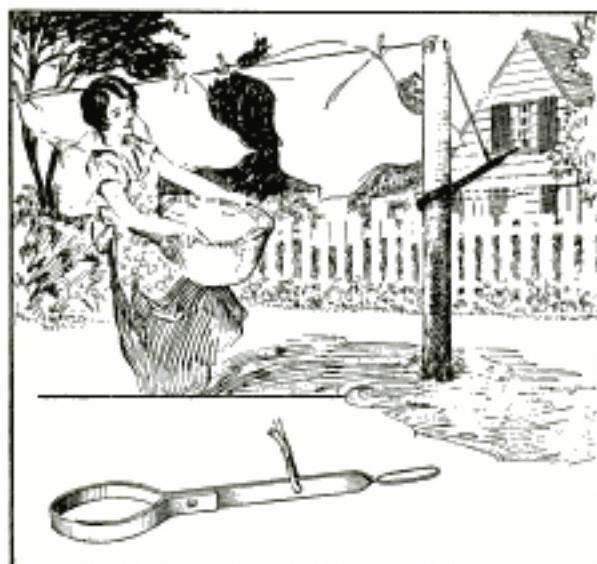
Cigarettes Stored in Hollow Book End

Constructed as shown in the illustration, a hollow book end will provide a convenient place for storing cigarettes. It can be made out of almost any kind of wood, the various pieces being cut to the shapes shown, and glued or nailed together. If desired, a small hole can be drilled in the top, which is hinged to the base, and an ash tray placed inside.

Suction Cup Holds Color Container When Lettering Windows

In putting temporary lettering on their windows, merchants will find the illustrated method of holding the color container useful, as it leaves both hands free. A suction cup, such as is used to hold ash trays on auto windshields and similar purposes, will do the job. Punch a small hole in the container and attach the cup to it by means of the bolt with which it is fitted.





Strap-Iron Lever Can Be Slipped Up or Down to Adjust the Clothesline

Keeping the Clothesline Tight

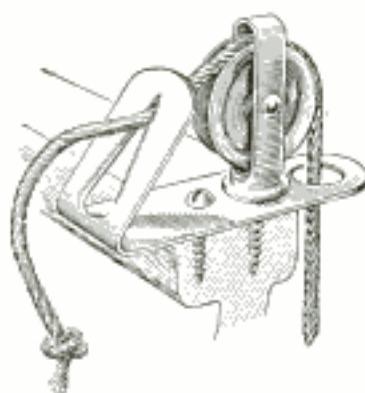
Made from a length of heavy strap iron, this tightener will keep your clothesline taut. One end of the iron is bent to fit loosely around the post, while the other is twisted to form a handle, as shown. The clothesline is run over a small pulley at the top of the post and fastened in a hole drilled in the holder at the point indicated. In use, the line is loosened or tightened by pulling down on the handle and slipping the looped end up or down on the post.

Holder for Rowboat-Anchor Rope

An anchor on a rowboat can easily be handled by the person rowing, without getting off the seat, by using this anchor-rope lock, which grips the rope and holds it in any desired position, yet allows it to

be loosened at will. It consists of a clothesline pulley and a length of flat iron, bent and attached to the bow of the boat. A tapered slot is cut in one end of the piece

of iron to receive the rope, after which this end is bent over at the angle shown. The edges of the slot are turned over to-



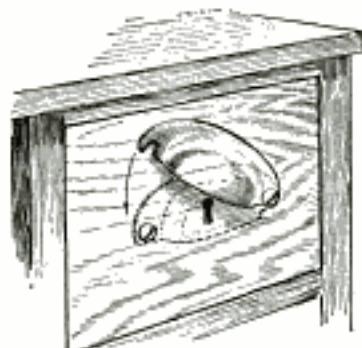
ward the pulley so that the rope will not be frayed. In use, the anchor rope is threaded over the pulley and through the slot, and a knot is tied at the end to avoid losing both rope and anchor. By merely giving the rope an upward jerk it is securely wedged in the slot. To loosen it, the rope is pulled down again.—George Madsen, Chicago.

Blackboard Made at Small Cost

By applying a coat of the following mixture, a good blackboard can be made of plywood, wallboard or even cardboard. To cover about 40 sq. ft. of surface, mix 4 tablespoonfuls of finely pulverized air-slaked cement or pumice in $\frac{1}{4}$ pt. of quick-drying black or dark-green enamel. This mixture must be stirred often while it is used and should be applied with a brush. If the surface is too rough after the coating has dried, it can be rubbed down with fine sandpaper.—E. J. Worley, Vancouver, B. C.

Drawer Pull Conceals Lock

An ordinary drawer pull can be made to serve as a cover for a lock by filing a small notch from the lower edge to one of the screw holes. The pull is placed over the lock and one end is screwed to the drawer loosely, so that the pull can be raised.



This arrangement is especially useful on small drawers where there is not enough room for both a pull and a lock.

How to Clean Camera Lens

A camera lens should be cleaned frequently, in order to keep the pictures free from a foggy appearance. A piece of absorbent cloth, such as is used for removing cold creams, will serve this purpose. The lens is wiped with a circular motion, from the center toward the edge, applying very little pressure.

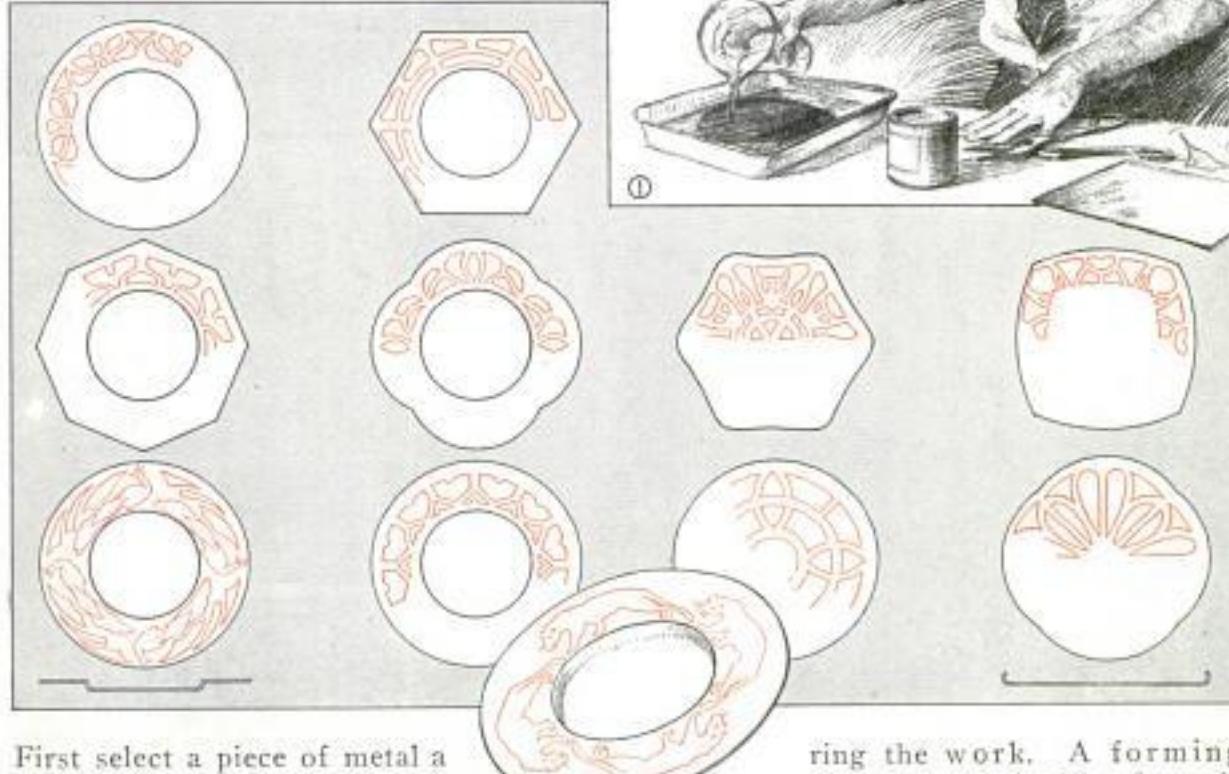


Etching Hammered-Copper Trays

ETCHING is perhaps the simplest process of producing beautiful patterns in sheet metal, and if carefully done, good results are assured. The trays illustrated here can be made from copper or brass. For large trays, No. 18 gauge metal is used, while smaller ones can be made from 20 gauge stock.

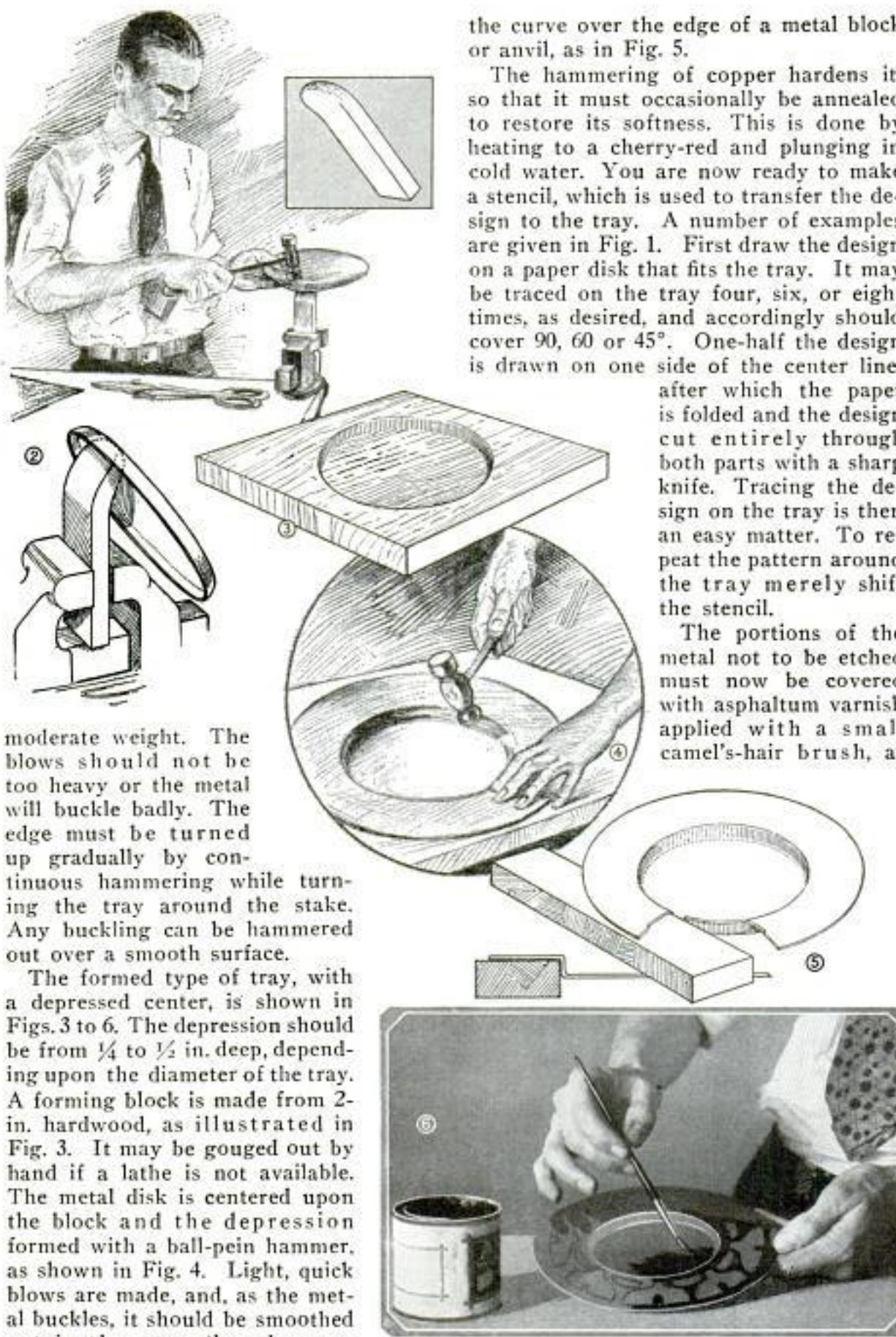
One type of tray has a depressed center and is known to the metal craftsman as a simple type of "formed" tray. The other is turned up at the edges and is known as "lipped," the edge being turned up from $\frac{1}{4}$ in. to $\frac{3}{8}$ in. depending upon its size.

a circle and cut away the surplus with a pair of snips. Then clamp the piece in a vise and file the edge smooth, using wooden blocks between the jaws to avoid mar-



First select a piece of metal a little larger than the diameter of the tray and flatten it over a heavy bench top, iron block or anvil. To do this, strike a succession of sharp blows on the metal with a wood mallet. When the piece is smooth, lightly scribe

ring the work. A forming stake, shown in Fig. 2, made of hardwood such as maple or beech, is used to turn up the edge of the tray, the curvature of the stake approximating that of the tray, and the forming is done with a wood or rawhide mallet of



moderate weight. The blows should not be too heavy or the metal will buckle badly. The edge must be turned up gradually by continuous hammering while turning the tray around the stake. Any buckling can be hammered out over a smooth surface.

The formed type of tray, with a depressed center, is shown in Figs. 3 to 6. The depression should be from $\frac{1}{4}$ to $\frac{1}{2}$ in. deep, depending upon the diameter of the tray. A forming block is made from 2-in. hardwood, as illustrated in Fig. 3. It may be gouged out by hand if a lathe is not available. The metal disk is centered upon the block and the depression formed with a ball-pein hammer, as shown in Fig. 4. Light, quick blows are made, and, as the metal buckles, it should be smoothed out in the way already mentioned. The final step is to smooth

the curve over the edge of a metal block or anvil, as in Fig. 5.

The hammering of copper hardens it, so that it must occasionally be annealed to restore its softness. This is done by heating to a cherry-red and plunging in cold water. You are now ready to make a stencil, which is used to transfer the design to the tray. A number of examples are given in Fig. 1. First draw the design on a paper disk that fits the tray. It may be traced on the tray four, six, or eight times, as desired, and accordingly should cover 90, 60 or 45°. One-half the design is drawn on one side of the center line, after which the paper is folded and the design cut entirely through both parts with a sharp knife. Tracing the design on the tray is then an easy matter. To repeat the pattern around the tray merely shift the stencil.

The portions of the metal not to be etched must now be covered with asphaltum varnish applied with a small camel's-hair brush, as

All Portions That Are Not to Be Etched Are Carefully Covered with Asphaltum Varnish, Which Should Be Dry before Etching

shown in Fig. 6, making sure that the edge and bottom of the tray are completely covered. Do not attempt to do this with a single application. It will be necessary to touch up the work wherever the metal shows through, for if the coating is too thin, the etching acid may eat through. Brush on the varnish evenly and carefully at the edges of the design to assure sharp outlines. Then lay the tray aside to dry.

The etching solution consists of one part of nitric acid and two parts of water, and must be kept in a glass or earthenware container. Be careful not to get the acid on the flesh or clothing as it may cause serious burns and will destroy fabric. It is a good idea to wear rubber gloves. Also, when mixing, pour the acid slowly into the water; not the water into the acid. Before the etching solution is applied to the tray, the latter must be thoroughly cleaned so that there is no trace of oil from the hands on the bare portions. Such cleaning is done by immersing the tray in a solution called a "pickle," which consists of 1 part of sulphuric acid and 15 parts of water, the same precautions being taken in preparing this mixture as with the etching solution. Allow the tray to remain in this solution for a few minutes and then rinse with clean water. Now place the tray in a glass dish and slowly pour on the etching solution, which will eat into the unvarnished parts. Small bubbles and fumes will arise as the acid attacks the metal. If bubbling is violent, the solution should be weakened with water. The action generates heat, and if the acid works too fast, the heat may soften the varnish. If the solution stops working, it is poured off and replaced with fresh solution. After the etching is done, the varnish is removed with turpentine or benzine, and the tray again pickled, rinsed and dried. A coat of transparent lacquer will prevent oxidation of the metal and consequent loss of luster.—L. Day Perry, Chicago.



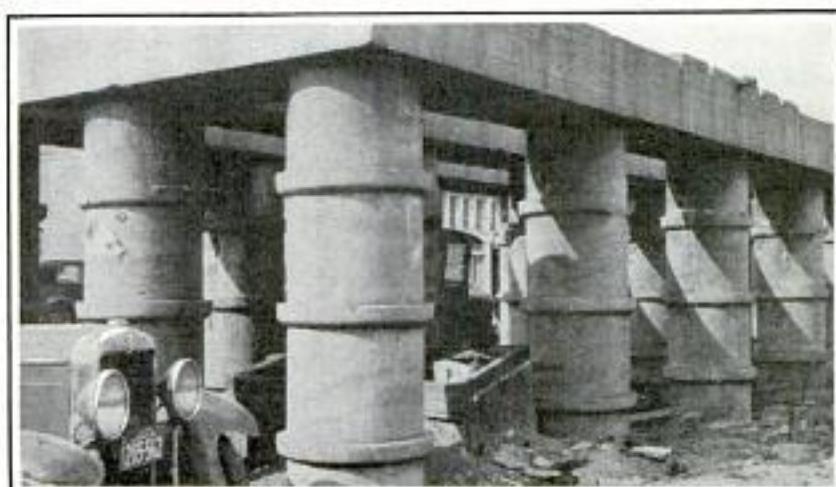
Pickax Properly Shaped Enables One to Remove Man-hole Covers Single-Handed

Manhole Covers Removed with This Tool

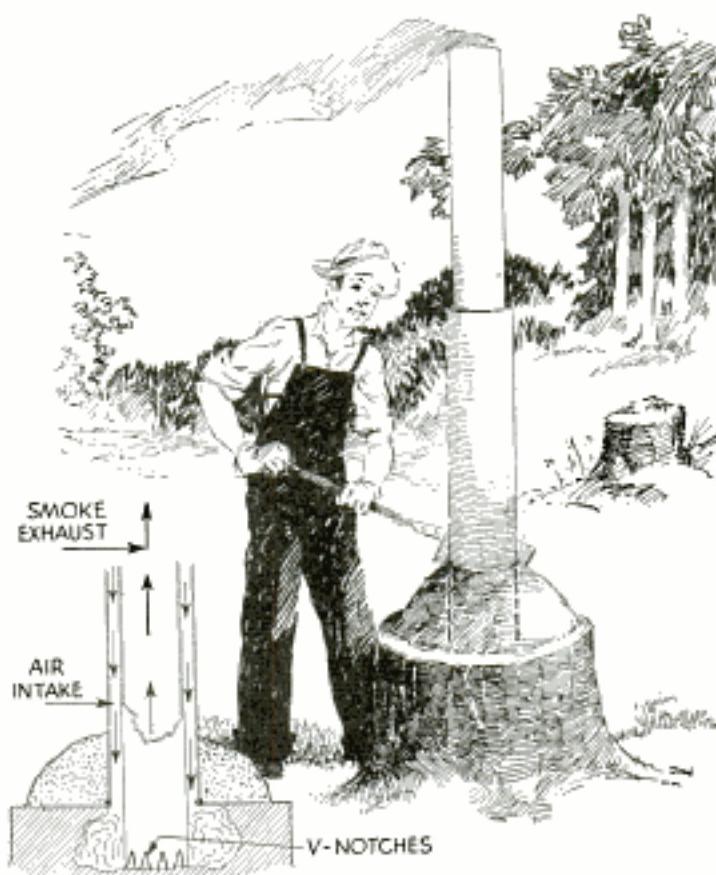
One man can easily remove manhole covers single-handed with this pickax, which has one end ground to fit the small hole in the covers. The other end is flattened to a chisel shape, as shown in the detail, for removing ice, tar, cement, etc., from the top of the covers.

Concrete-Viaduct Pillars Poured in Sewer-Pipe Forms

When building a viaduct on a grade elevation, one railroad used concrete sewer pipe or forms in making the pillars. The pipe is left in place on the finished job, and furnishes a good jacket.



Sections of Large-Size Concrete Sewer Pipe Can Be Quickly Set Up to Provide Durable Forms for Viaduct Pillars



Stumps Are Easily Burned Out with Two Pipes Arranged to Furnish Sufficient Draft to Keep the Fire Alive

Burning Out Stumps Quickly

Stumps can be burned out with very little work by following the method illustrated. Two lengths of sheet-metal pipe are made, one 6 in. in diameter and 6 ft. long, having large notches cut at the bottom to allow draft for the fire, and the second 8 in. in diameter and 3 ft. long, with small notches cut at the top end and crimped over to center the other piece, which is slipped inside. A large flange at the bottom of the outer pipe serves to hold it in place on the stump. In use, the assembly is arranged on the stump and kerosene is poured down the smaller pipe and lighted by dropping a piece of burning paper on it. Air coming down between the pipes will supply sufficient oxygen and cause the fire to burn out the stump. As the wood is consumed, the inside pipe will sink gradually continuing to furnish the proper draft for the fire, and this goes on until the stump has been completely hollowed out or consumed.

COld plane butts can be made into excellent scrapers for wood-finishing work.

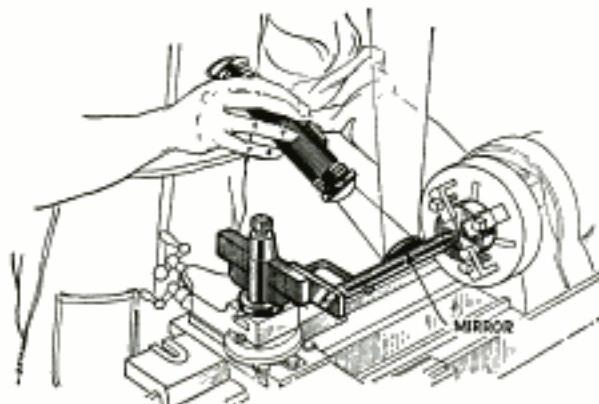
How to Avoid Breakage of Taps

Breakage of small taps can usually be prevented by exercising a little care. Be sure to use the correct size for the hole to be tapped. Using a too small one not only makes more work for the tap to do, but also causes it to bind and break. Let the first tap cut as much as possible, but do not force it. The holes should be drilled all the way through, provided, of course, that the work is not too thick, or that it will not be weakened by the hole. A deep hole will prevent the tap from coming in contact with the bottom which often causes it to break. Therefore, if the hole cannot be drilled all the way through the work, it should be drilled a little deeper than necessary. If the hole must be tapped to the bottom, be sure to clean out all chips, or they will "mat" and not allow the tap to cut to the full depth. If a tap breaks in the hole and cannot be removed with

tools made for this purpose, it will have to be annealed and drilled out.

Locating Faceplate Work on Lathe with Aid of Mirror

In the absence of a test indicator to locate a punch mark on the work centrally on the faceplate, accurate results can be obtained by the use of a small mirror attached to a rod with pointed ends. The work is clamped on the faceplate in the usual manner and one end of the rod is

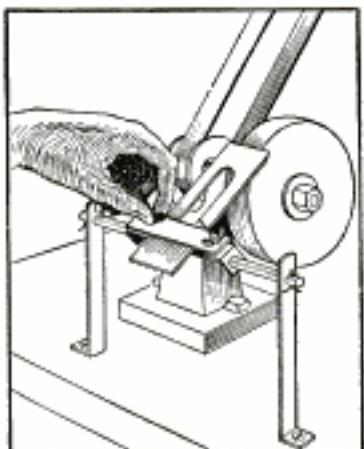


Small Mirror and Flashlight Used to Locate Center-Punch Mark on Lathe Faceplate

engaged with the center-punch mark, while the other is inserted in a small hole drilled in a piece of flat stock clamped in the tool post. An L-shaped pin, also attached to the rod, engages with the tool post to prevent it from turning. A flashlight is used to direct a beam of light against the mirror, which reflects it against the ceiling or wall. If the work is not accurately located on the faceplate, an oscillating motion will be imparted to the mirror, which will be exaggerated by the reflection on the wall.—R. H. Kasper, Philadelphia, Pa.

Jig for Grinding Correct Bevels

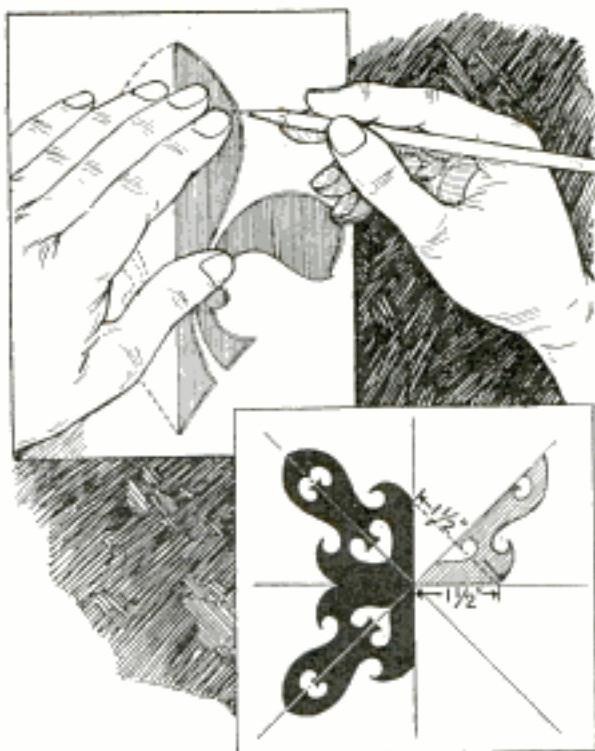
This jig for grinding tools, such as plane bits, chisels, etc., to the correct bevel, consists of two flat-iron uprights with one end bent over at right angles and screwed to the bench top, while the upper end is drilled to receive a rod. The length of the uprights should be equal to the distance between the bench top and the center of the wheel. A U-shaped piece, with the ends drilled to make a sliding fit on the rod, forms one side of the tool clamp, while the other consists of a piece of flat iron, both being held together by means of two screws fitted with wing-nuts. The rod is kept in place by cotter pins fitting holes at the ends. In use, the plane bit or other tool is clamped in position and held against the grinding wheel at the correct angle, which is largely determined by the distance from the edge of the wheel to the jig.—R. H. Copeland, Talladega, Ala.



place by cotter pins fitting holes at the ends. In use, the plane bit or other tool is clamped in position and held against the grinding wheel at the correct angle, which is largely determined by the distance from the edge of the wheel to the jig.—R. H. Copeland, Talladega, Ala.

Templates for Matching Curves

Artists and draftsmen, who experience difficulty in matching irregular curves of a symmetrical design, will find the use of a template handy. Sketch one-half or

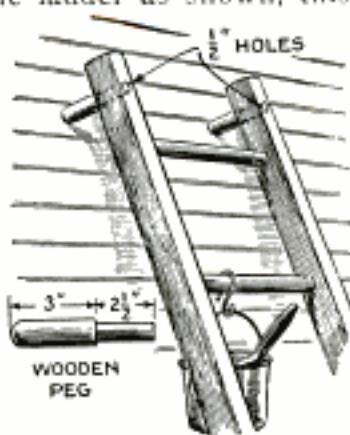


Templates Cut for Producing Symmetrical Designs Aid in Duplicating Irregular Curves

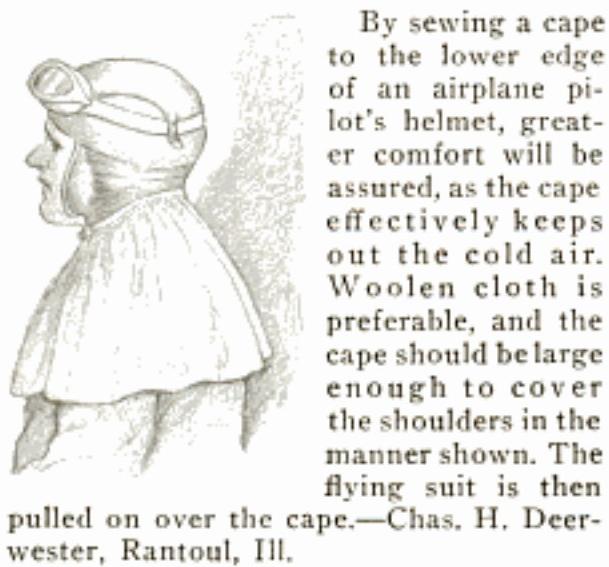
one-quarter of the design on paper, then cut it out and use it as a template. If the design is simple, it is often possible to fold the paper and cut the desired shape without sketching. Fold it once for a two-part design and twice for a four-part design. If it is to be repeated several times, thin board or stencil paper should be used instead of ordinary paper.

Wooden Plugs Hold Ladder Away from Building

When painting the upper part of a building, it is inconvenient for the worker to run down and move the ladder in order to paint around its upper end. By fitting pegs in the ladder as shown, this trouble is avoided. The pegs are made of hardwood, and driven into holes drilled in the sides about 2 in. from the ends.—Bert Moorehouse, Pasadena, California.



Cape Sewed to Helmet Keeps Pilot Warm



pulled on over the cape.—Chas. H. Deewester, Rantoul, Ill.

Soldering Iron Is Adjustable

Here is a soldering iron that can be set at several different angles. Round off one end of the iron and fasten a U-shaped length of strap iron to it with a pin, which is inserted into a hole drilled for this purpose. A piece of iron rod to form a handle is threaded at one end to fit a tapped hole in the bottom of the U-shaped strap, and is fitted with a locknut. Shallow holes are drilled in the rounded end of the

soldering iron to receive the end of the handle. In use, the iron is held at the angle desired, and the handle is screwed down until the end en-

gages one of the holes. Then the locknut is driven down to hold the handle in position.

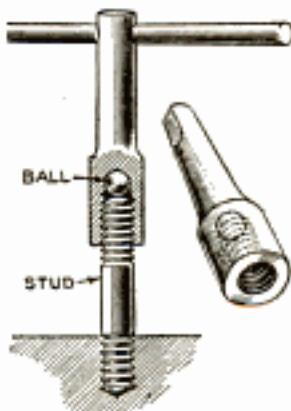
Compound for Pipe Joints

A pipe-joint compound that will not "rust-set" the couplings, or otherwise make them hard to uncouple, can be made by mixing molasses, 1 gal., air-floated graphite, 10 lb., and oil of mirbane, 1 fl. oz. If the compound is used imme-

diate after mixing, the oil of mirbane may be omitted, as it acts only as a preservative for the molasses. This compound is applied to boiler plugs, gaskets, or other fittings that are subjected to heat, and it supplies a lubricant to the threads of the couplings.—E. Perry, Oakland, Calif.

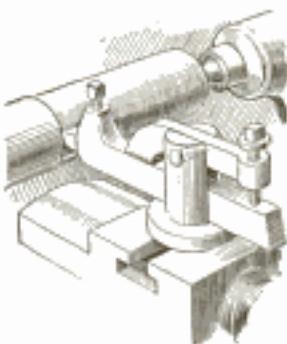
A Tool for Driving Studs

Studs can be driven with the illustrated tool without damage to the threads. The tool is made of cold-rolled steel rod to fit the stud. In one end of the rod, a hole is drilled and tapped to a depth equal to one and one-half times the diameter of the stud. A steel ball, of suitable size to keep it from falling out, is driven to the bottom of the hole to form a bearing for the end of the stud; whereupon the tool is ready for use. Two types of this tool are shown, one for hand use and one for power use.—Omar Fluharty, Columbus, Ind.



Brace Makes Lathe Toolholder More Rigid

If the lathe tool chatters when taking heavy cuts, due to lack of rigidity in the holder, the trouble can be overcome by using the brace shown here. The toolpost is slotted and drilled to receive a pin on which the brace pivots. One end of the latter is bent and notched to form teeth, while the other end is drilled for the regular toolpost screw, with which the brace is clamped against the tool securely. Braced in this manner, a toolpost will be more rigid, owing to the two-point support.



¶A piece of cloth saturated with oil and wrapped around your extra fretsaw blades will keep them from rusting.

A Lathe for Large-Diameter Work

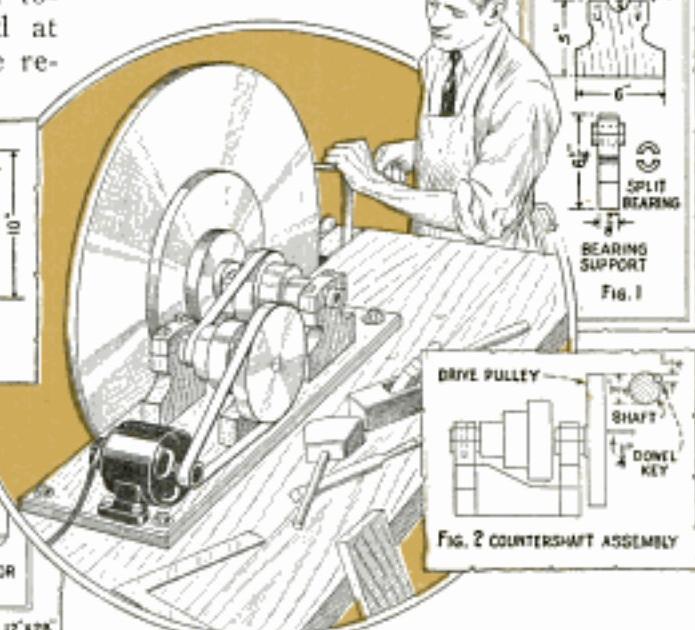
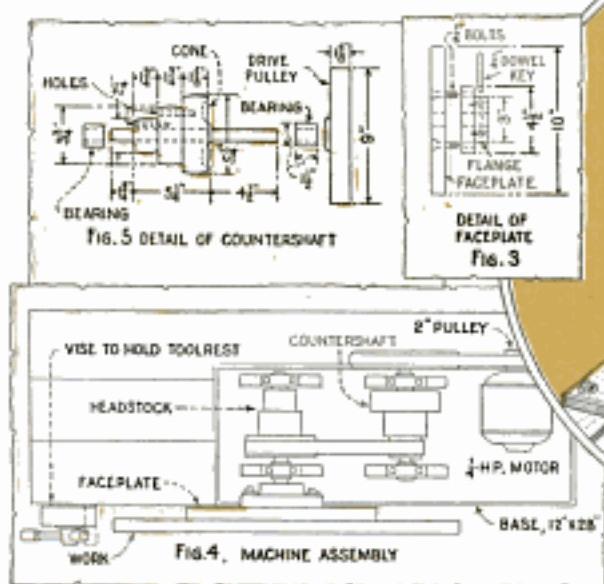
By W. CLYDE LAMMEY

AS a rule a 10 or 12-in. disk is about the largest that may be safely turned on the outer end of the headstock spindle of the average small wood lathe. Where the work is 20 in. or more in diameter, the spindle speed should not exceed 500 r.p.m. for the first truing cut, and even for the final finish cut, the speed should not be over 800 r.p.m. However, a lathe giving the necessary reduction in speed, to permit turning faceplate work up to 36 in. in diameter, is easily made from materials readily available. It consists simply of a headstock with a three-step cone pulley and a countershaft, also with a cone pulley, driven by a $\frac{1}{4}$ -hp. motor, the whole assembly, as shown in Fig. 4, being constructed of hardwood.

Each step of the cone pulleys consists of two disks, $\frac{3}{8}$ in. thick and glued together with the grain of the wood at right angles. Thus, twelve disks are re-

quired for the two cone pulleys. Glue up the two disks forming each step separately, then glue the three steps together, taking care that they are centered so that they will turn true. Bore two $\frac{1}{4}$ -in. holes parallel to the axis and near the edge of the rim on both intermediate and smaller steps, at the points indicated by the dotted lines in Fig. 5, the holes being slightly deeper than the thickness of the single

step. Key the steps with $\frac{1}{4}$ -in. dowel rod on both countershaft and headstock pulleys. Next, center a $\frac{3}{4}$ -in. hole through both cone pulleys. If possible, this should be done on a drill press, but if you must bore the hole with a brace, be careful to get it as accurate as possible from both ends, the two holes meeting at the center. For spindles carrying the countershaft and headstock cone pulleys, cut two $1\frac{3}{4}$ -in. lengths from 1-in. dowel rod, mount between centers in the lathe and turn down to exactly $\frac{3}{4}$ in. in diameter throughout the length. Drive the spindle through the cone pulley, place it as indicated in Fig. 5, bore a $\frac{1}{4}$ -in. hole transversely



For Turning Large-Diameter Work, This Homemade Lathe Gives Ample Power at the Right Speed

quired for the two cone pulleys. Glue up the two disks forming each step separately, then glue the three steps together, taking care that they are centered so that they will turn true. Bore two $\frac{1}{4}$ -in. holes parallel to the axis and near the edge of the rim on both intermediate and smaller steps, at the points indicated by the dotted lines in Fig. 5, the holes being slightly deeper than the thickness of the single

through the center step of each pulley, and drive in a key cut from $\frac{1}{4}$ -in. dowel rod. Remount the work between lathe centers and turn the pulleys to the diameters and widths indicated, the three steps of each being turned to exactly the same diameters, so that the belt will run with equal tension on any two of the steps. The steps should be only slightly crowned. The four bearing supports are band-sawed from $\frac{3}{8}$ -in. hardwood to the

dimensions and shape indicated in Fig. 1, while the four split boxings are formed from hard-maple disks.

The countershaft drive pulley is made

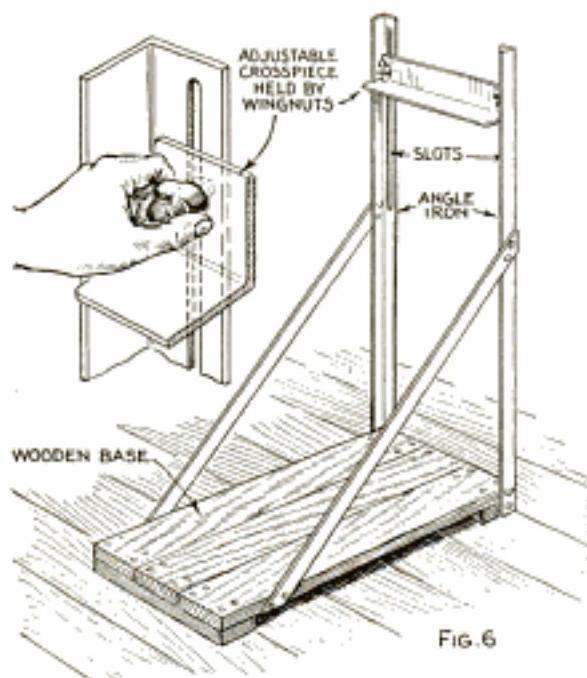


FIG. 6

The Worker's Weight on the Base of the Tool Rest Holds It in Position While Turning

from two disks of $\frac{3}{4}$ -in. stock, $9\frac{1}{2}$ in. in diameter, glued together with the grain at right angles. The edge should be crowned slightly. Center a $\frac{3}{4}$ -in. hole clear through, drive the pulley on the end of the countershaft spindle and key as in Fig. 2, the key being cut from $\frac{1}{4}$ -in. dowel rod and driven in a $\frac{1}{4}$ -in. hole bored parallel to the spindle, half in the latter and half in the pulley.

Fig. 3 details the construction of the faceplate, the flange being formed from two hardwood disks glued together and further secured with screws, centerbored $\frac{3}{4}$ in. and keyed to the headstock spindle with a traverse key as in Fig. 3. Scribe a $3\frac{1}{4}$ -in. circle on the face of the flange rim, and bore four $\frac{1}{4}$ -in. holes, equally spaced, with the centers on the line. Then scribe, saw and turn a 10-in. disk from $\frac{3}{4}$ -in. hardwood, scribe a $3\frac{1}{8}$ -in. circle about the center and bore four equidistant holes, centering on the line and counterbored to take $\frac{1}{4}$ -in. bolts. Bolt the faceplate to the flange rim and assemble the headstock and countershaft on a base, 12 by 28 in. in size, making sure that the parts are the same distance apart, and that the pulleys are in line. Bolt a $\frac{1}{4}$ -hp. motor to the

base, the motor pulley lining up with the countershaft drive pulley. Bolt the assembly to the bench top in such a position that a tool rest may be clamped in the bench vise as shown. Another handy tool rest for use with the lathe may be made as in Fig. 6, the slotted angle-iron uprights allowing quick adjustment.

The operator stands on the wooden base, his weight holding it securely in place while turning.

Ammonia Gives Wood Finish of Fumed Oak

Ammonia can be used to give wood a fumed-oak finish. The wood is placed in an air-tight chamber as soon after planing as possible, and is there exposed to ammonia fumes until it has taken on the required depth of color. If desired, the ammonia can be applied to the surface of the wood with a cloth. If a chamber is used, care should be taken that the fumes will reach all of the surfaces to be fumed and for this reason the work should be suspended.—John E. Hyler, Peoria, Ill.

Tongs Grip Goods on High Shelves

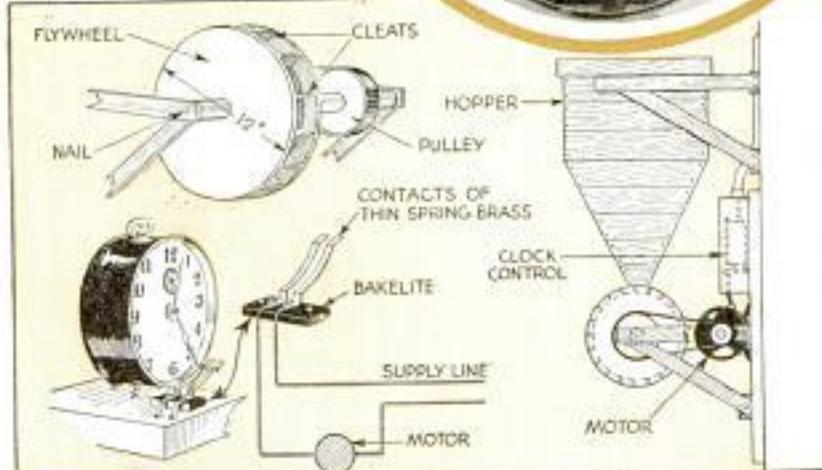
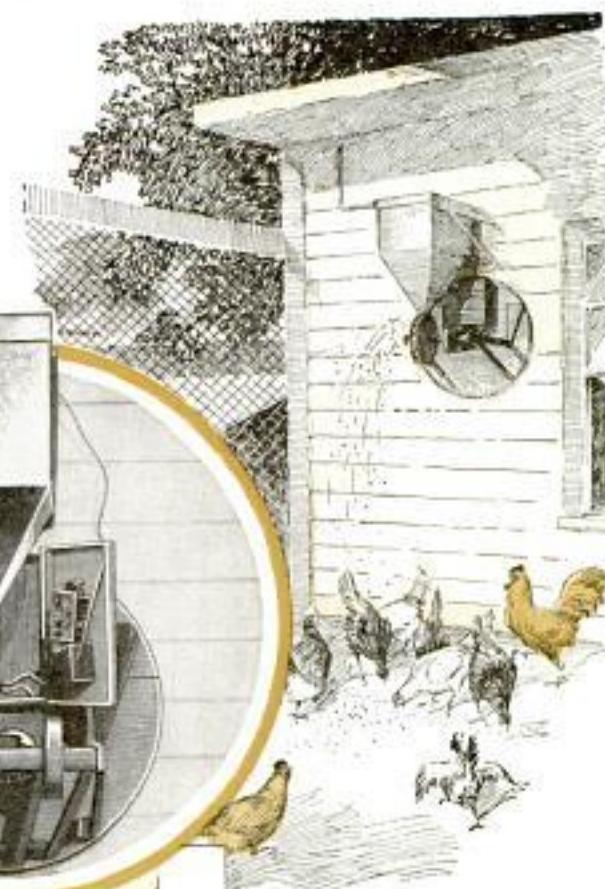
Tongs for gripping articles on high shelves that are out of one's reach, can be made from a broomstick, three 1-ft. lengths of $\frac{1}{8}$ -in. flat iron, and some No. 9 galvanized-iron wire. Two of the flat-iron



strips, bent to form jaws, are pivoted together as indicated in the drawing, and one of them bolted to the end of the broomstick. The third strip is doubled and pivoted on the broomstick near the lower end providing a lever, which is connected to the movable jaw by the wire so that the latter will open or close the jaws.—Jerry Koan, Schoolcraft, Mich.

Electric Feeder Serves the Poultry on Time

It is not necessary to be home just to feed the poultry or to depend on your neighbor's good will in doing this chore. If you are supplied with electric-lighting current, an automatic feeder can quickly be rigged up with a small motor and an eight-day clock. Build a hopper of suitable size similar to that shown, providing it with a funnel-shaped bottom to let the grain drop out. A 12-in. wheel, made as shown in the detail, is built up from a core, two side disks and a number of cleats, spaced equidistantly between the latter. The wheel is mounted on a wooden shaft so that it comes directly under the spout of the hopper, which must be the same size as the



Electric Feed Dispenser Runs Twice Every Day, and Insures That Your Poultry Will Be Fed While You Are Out Visiting

width of the wheel, to avoid dropping grain when the wheel is at rest. It is obvious that the feed drops into the spaces between the cleats and is thrown a considerable distance when the wheel is revolved. The shaft is mounted on a pair of hangers or brackets, also made of wood. A pulley on the shaft is belted directly to a motor of about $\frac{1}{6}$ hp. The clock operates an improvised switch, which sets the motor in operation for a few moments twice

every 24 hours, at any predetermined time, depending on how the switch and clock are arranged. The switch consists of two light spring-brass strips, mounted parallel on a piece of bakelite and connected in the circuit as shown in the diagram. A small brush is attached to the hour hand of the clock to wipe over the spring contacts, closing the circuit.

The length of time the brush touches the contacts determines the quantity of feed scattered.

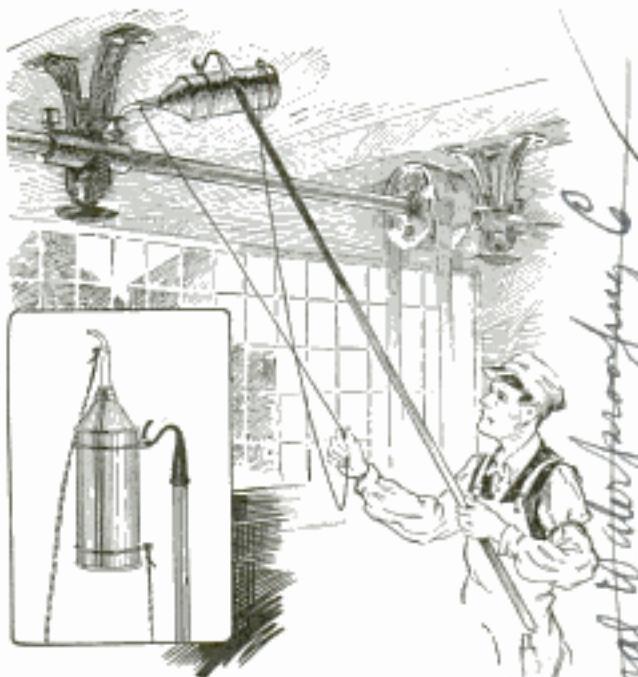
A Good Cement for Celluloid

For fastening celluloid to wood, metal and other substances, a satisfactory cement can be made up of 2 parts of shellac, 3 parts of spirits of camphor and 4 parts of alcohol.

~~Powdered iron~~ Central
~~Dumentz~~ Co. 4608

**Concrete Can Be Waterproofed
with Pulverized Iron**

Concrete, brick and masonry walls can be waterproofed by the use of finely pulverized iron mixed with water and applied with a brush. When the water soaks into the wall, it carries the fine iron particles into the pores of the concrete. By rusting, the particles swell to many times their original size and completely seal the pores. As rust does not deteriorate with age, concrete treated in this manner will be permanently waterproofed. The coating of rust may be covered with plaster troweled on, or by a wash coat of cement mixed with water and applied with a brush. The bonding power of the iron will insure a permanent repair on broken or cracked walls. Another use for pulverized iron is in hardening concrete floors. The iron is scattered over the surface before the concrete has set and is then troweled in. This increases the wearing qualities of the floor and makes it both oil and waterproof.



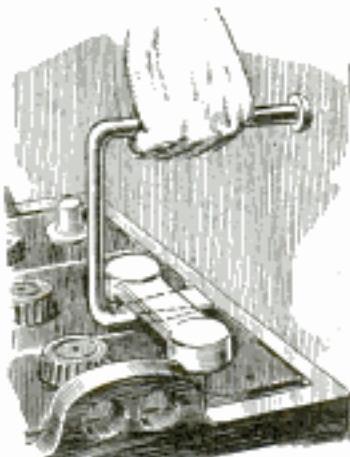
Oilcan with Long Handle and Cord Oils Overhead
Shafts without Use of a Ladder

Oiling Overhead Shafts

Shafts that are out of reach with an ordinary oilcan, can easily be lubricated by using one with a long handle. A wire band is clamped around the can near the top and a loop formed to receive a hook on the end of the handle. Other wire bands are drawn up around the bottom and the spout of the can so that the ends of a long cord can be attached, enabling the worker to manipulate the can easily, so that the bearings can be reached by merely tilting the can.

Hook for Removing and Carrying Storage Batteries

With the hook shown in the illustration, storage batteries can be removed



from their compartments and easily carried about. The tool consists of a length of iron rod, flattened at one end, and bent to shape as indicated. In use, it is slipped under the cell connectors.

A Sunshade for Fruit Stands



Repairing Copper Tubing

A copper gasoline or oil line that is nearly worn through can be repaired by "floating" solder on the weakened spot to build it up. Unless reinforced, the pipe will eventually break at that point.

16 P. Jan 666

A RUBBER-TIRED TEA CART

By L. DAY PERRY

ATTRACTIVELY finished in lacquer, in one or two tones or colors as you desire, a tea cart is one of the most useful pieces of furniture, and the fact that it has a distinctive touch of home craftsmanship, gives it still greater value.

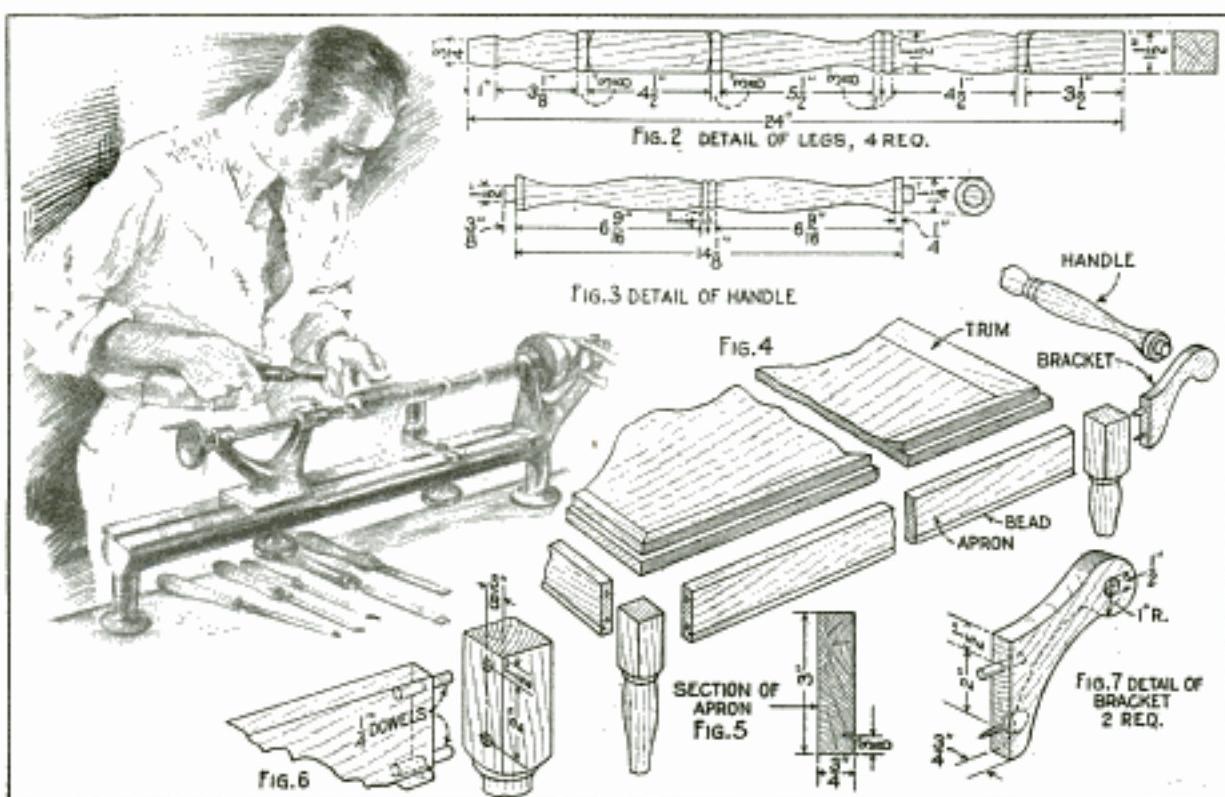
You may use your own judgment about the wood to use, considering, of course, the kind of furniture in your home and its finish. Oak, walnut and mahogany are all excellent woods, particularly where a natural finish is used, although poplar is an easy wood to work with, if you intend to finish it in lacquer.

Over-all dimensions are given in Fig. 1. The construction may begin at any point, but the turned work is a good starter. Square up the four posts to the finished size in width and thickness, allowing a little excess length for cutting off after removing them from the lathe. Detailed dimensions for the posts are given in Fig. 2. Note that the cuts are simple ones, and that there is no undercutting. Care must be exercised, however, for the four legs must be alike. This requires much closer application to size than if only one is required. While turning, the handle, as shown in Fig. 3, is also completed. The turned pieces are then sanded and laid aside until needed. The two brackets for the handle, detailed in Figs. 7 and 14, are next. First make a



pattern of stiff paper in accordance with the sketch, 1-in. squares being used as guides in laying out the contour. This is then traced on wood, the surface being finished beforehand. A coping or band saw is used to make the cut-out, and the edges are then finished by filing and sand-papering. The holes for the screw and dowel pins and the mortise for the tenon on the handle are next, after which the handle and the bracket are assembled with glue and clamped in position.

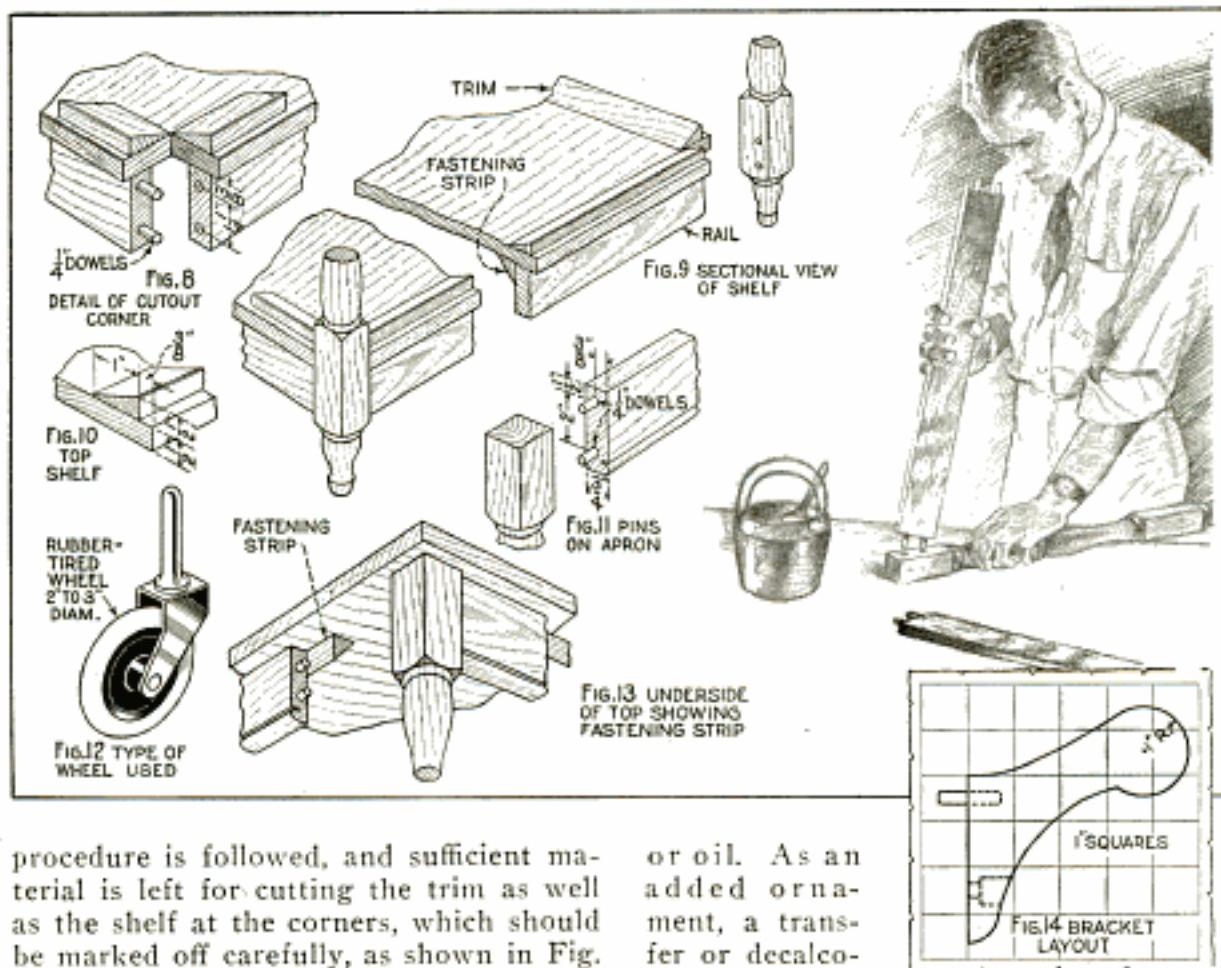
The shelf rails and top aprons, shown in Figs. 4, 5, 6 and 8, should then be cut out and finished to size. The rails are plain, and the aprons have a bead along one edge. The eight pieces are cut to size; then the bead is run on each apron with a combination plane using a bead cutter of the size indicated in Fig. 5. Each apron is clamped



flat upon the bench top with one edge projecting slightly over the top to cut the bead. Now locate and bore the holes for the $\frac{1}{4}$ -in. dowel pins. The positions of the holes in the apron are shown in Figs. 6 and 11, and those for the shelf rails are given in Fig. 8. The holes on the posts are located and bored next. Place the posts side by side on the bench and mark them together for the dowel holes. The rail should be located 5 in. from the bottom, as shown in Fig. 1. A doweling jig will be found a great convenience and timesaver in boring the holes for the pins, assuring a clean, straight cut. It is important that a dowel bit be used when boring, as it is a shade undersize and thus provides a snug fit for the dowels. After the holes in the posts, rails and aprons have been bored, the pins are glued and driven into the rails and aprons. Posts, aprons and rails are then assembled and clamped tight, the corners being tested carefully for squareness and wind. Excess glue should be sponged off with warm water, for glue is difficult to remove after it has hardened.

The handle and brackets are next attached to the posts, as shown in Fig. 4, a screw being used here to give additional strength. After the screws have been set,

plug the screw holes and finish off smooth with the brackets. The top and shelf should be either three or five-ply veneer. If solid material is used, there may be some shrinkage, especially when pieces are glued crosswise, as is the case with the trim. The use of plywood eliminates such shrinkage. Cut and finish the top and shelf to dimensions given in Fig. 1, then make the trim, working it down from a fairly wide board with an ordinary plane. When the proper slant is obtained, the strip is ripped from the board, and the board is again planed to form another piece. The trim is then sanded down to the contour shown in Fig. 10. The position of the trim on shelf and top is also given here. The joining ends of the trim should be mitered, and the strips are then tacked in position on the top and the joints tested for accuracy. If the fit is satisfactory, remove them, spread glue on the underside and at the joint, and nail them down securely, if the surface is to be lacquered. Use finishing nails and set the heads slightly. If the finish is to be left natural, the trim should be held with screws driven in from the underside. As the shelf has its corners cut to fit around the posts, it is obviously not necessary to cut miter joints. Otherwise the same



procedure is followed, and sufficient material is left for cutting the trim as well as the shelf at the corners, which should be marked off carefully, as shown in Fig. 8. The fit should be a snug one, but the shelf must not be driven into place, or the glue joints may open. Both the top and shelf are held to the framework by means of triangular fastening strips, as shown in Fig. 13, which are glued and fastened in place with screws. The entire assembly should be sanded where necessary and the nail heads covered with crack filler, which is also sanded down smooth after it has hardened. A coat of thin shellac is then applied. Rubber-tired casters, 3 in. in diameter, may be purchased from hardware dealers. Holes of the correct diameter for the shanks of the casters are drilled in the legs, taking care to get the holes straight.

Sand the coat of shellac lightly after it has dried, and apply a coat of lacquer. Allow the lacquer to dry at least one hour before applying a second coat, and at least two hours before applying a third, three coats being sufficient. The beads on the turnings and the edges of top, shelf and brackets may be given a contrasting color. Lacquer may be left dull or it may be polished with rottenstone and water

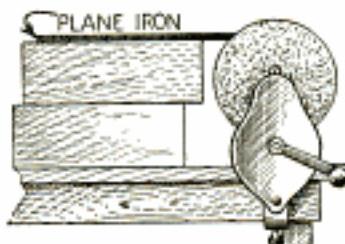
or oil. As an added ornament, a transfer or decalcomania of delicate harmonious colors may be applied in the exact center of the top. These may be purchased from paint stores, and a booklet giving full directions for their application may be had for the asking.

Rest for Grinding Tools to Correct Bevel

To hold tools at the correct angle when grinding them on an emery wheel is a difficult performance, but can be simplified by using a number of wooden blocks for a tool rest. When the proper height has been attained to get the correct angle

with the tool lying flat on the blocks, you may be reasonably certain that a good job will result, provided, of course,

the tool is fed against the wheel uniformly.—A. M. Parker, Edmonton, Alberta.

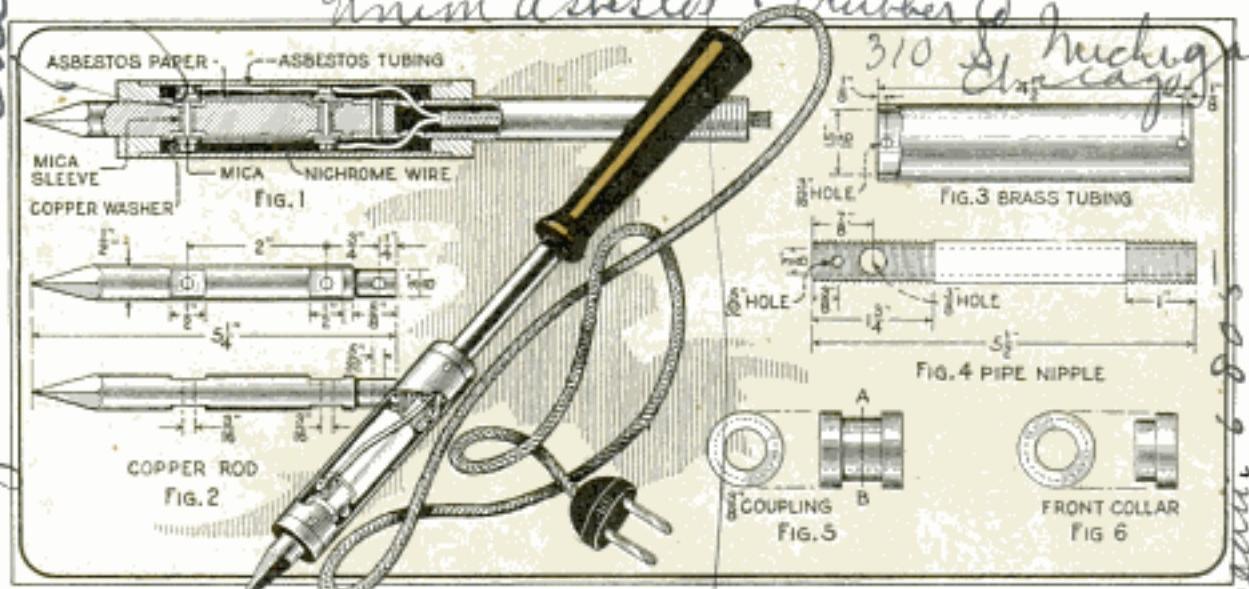


Shawton Manual
Training Supply Co.
Tunica, Miss.

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D. L. Farnan
211 N. Dearborn
Chicago

Durable Electric Soldering Iron for the Shop



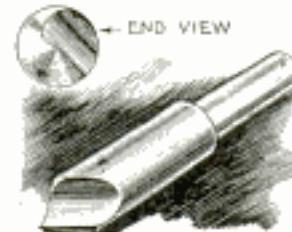
Here Is a Durable Electric Soldering Iron That Can Be Made at Small Cost; It Has Many Uses around the Average Home Workshop and Will, with Proper Care, Last for Many Years

For general purposes around the home, this heavy-duty soldering iron has the advantage over smaller ones that it holds the heat. Get a $\frac{3}{8}$ -in. pipe coupling and cut it in half as shown in Fig. 5, forming two separate collars. Turn one-half of each down to $\frac{15}{16}$ in. One is screwed onto a short $\frac{3}{8}$ -in. nipple, which is cut off flush on both sides and filed out to fit a $\frac{1}{2}$ -in. rod, while the other is screwed onto a $\frac{5}{8}$ -in. nipple, threaded $1\frac{1}{4}$ in. at this end. Drill a $\frac{3}{8}$ -in. hole through the nipple as in Fig. 4. A copper rod, $5\frac{1}{4}$ in. long, is filed to a point at one end, while the other end is turned down to $\frac{3}{8}$ -in. diameter to fit snugly inside of the nipple, after which both are drilled for a 6-32 machine screw. File four $\frac{1}{2}$ -in. flats on the rod, as shown in Fig. 2, and drill a $\frac{3}{16}$ -in. hole through each pair. Insert mica sleeves or bushings in the holes, put mica washers on the flats and smaller brass washers over them before inserting brass screws and screwing on nuts. Make sure that neither washers nor screws touch the rod. The next step is to wrap a layer of asbestos paper or mica around the rod between the flats and wind on 48 turns of No. 30 gauge nichrome wire, allowing a slight space between turns. Take care that the screws, washers and wire do not touch the rod, or a short circuit may result. Attach the ends of the wire under the heads of two screws, together with

the bared ends of a 6-ft. length of stranded asbestos-covered copper wire, drawn through the $5\frac{1}{2}$ -in. nipple and slipped through the $\frac{3}{8}$ -in. holes. If asbestos-covered wire is not available, use asbestos tubing over the ends inside of the iron. A brass sleeve, having an inside diameter of $1\frac{1}{16}$ in., is slipped over the collar on the nipple, whereupon the other collar is slipped over the copper rod and into the sleeve. Small holes are drilled and tapped in each collar and in the sleeve for 6-32 screws, which hold the assembly together. Fit a suitable hardwood handle, drilled lengthwise and threaded to fit the end of the nipple, then attach a plug to the cord, and the iron is ready for use.

Erwin R. Erdmann and Leonard R. Giuliano, Chicago.

Countersink for Soft Metals Does Not Burr



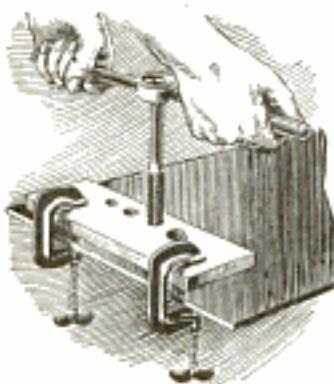
The illustrated countersink is made from a short piece of drill rod, and has proved useful for soft metals, such as aluminum. The point is ground as shown in the detail, and then hardened. Having no clearance back of the cutting edge, it does not form burrs around the hole.

Mica distributor Co. 200 Harrell Avenue

Causes of Overheated Lumber Saws

One of the most common causes of overheated lumber saws is that the inside of the saw collar is out of true, which can be remedied by truing the inside of the collar on a lathe. Other causes are too much play in the mandrel, poorly fitted bearings, improper lining of the saw with the carriage and track, too much or not enough lead to the saw, teeth not set enough to clear the saw properly, too fast a feed, too fast or too slow a sawing speed, saw greatly worn out of round, saw bent, kinked or dished the wrong way, and badly worn shanks in an inserted-tooth saw or improperly tensioned saw for the work being done. Once the cause of the overheating is determined, it can easily be remedied. If a saw has been badly burned by overheating, the tension is usually hard to control and the saw should, therefore, be sent to the factory to be retempered and tensioned.—W. L. Brown, Gravette, Ark.

Guide for Tapping Soft Materials



Soft materials, such as hard rubber, bakelite and hardwood, can be tapped without producing a ragged thread by the use of this guide. It consists of a metal plate having holes of different sizes drilled and tapped through it. In use, the guide is clamped on the work so that the hole in it coincides with one of similar size in the plate, and the tap is then driven through.

Artists' Paint-Mixing Pan

Indented pasteboard separators used in egg crates make serviceable pans for mixing small quantities of paint, each cup being used for a different color. It is a good idea to give the pasteboard a coat of shellac or varnish to prevent the paint from soaking through, and also to stiffen the pan.—W. A. Allhands, Cliffside, N. C.

Yardstick Holds
Wallpaper Roll at
End of Paperhanger's
Paste Table

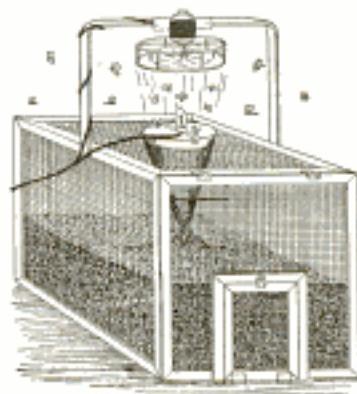


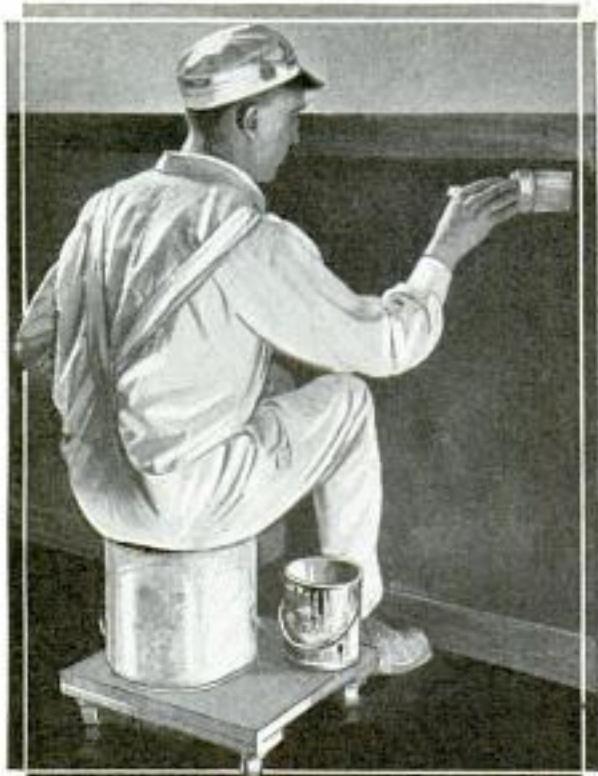
Guard Holds Roll of Wallpaper

To keep a roll of wallpaper at one end of the paste table, the illustrated guard has been found effective. It consists of two slotted dowels, 3 in. long, inserted in holes drilled near the edge of the table. A yardstick is slipped into the slots, and the paper can then be unrolled in the manner indicated. The yardstick keeps the roll in position and leaving both hands free to handle the paper. This method is better than allowing the roll to rest on the floor where it may become soiled.

Bug Trap Increases Poultry Profit

A bug trap, which provides his poultry with a good supply of food, has been found entirely practical by a western poultry raiser. It consists of a screen box with a small door at one end and an inverted screen cone in the top, through which insects enter. An electric fan of large size is mounted directly over the cone to force a strong current of air down, while an electric lamp is set over the cone. At night, the lamp attracts insects, and the strong current of air from the fan forces them through the cone and into the trap.





Low Platform Fitted with Casters Provides a Seat for the Painter in Wainscoting Walls

Painter Finds Wheeled Cart Aid in Wainscoting Walls

Four small casters and a board, about 20 in. square, form a cart which one painter finds of great help in wainscoting walls. An inverted pail serves as a seat leaving sufficient space for the paintpot. The cart is pushed along as the work proceeds.—F. H. Townsley, Chicago.

Flat-Iron Handle Gives Leverage to Turn Large Pipe Flanges

When a pipe flange is too large to be held by any available pipe wrench, and holding the flange in a vise seems the only alternative, use the illustrated tool. It consists of a length of $\frac{1}{2}$ by 2-in. stock with one end bent to fit over the edge of the flange. Several holes for bolts are drilled at the points indicated, and one is also drilled through both parts of the bent end to receive a pin. In use, the tool is slipped over the flange and the pin is inserted as shown. Then a bolt is passed through one of the holes in the handle and a flange hole, to provide a fulcrum. Considerable leverage can be obtained with this handle.

cated, and one is also drilled through both parts of the bent end to receive a pin. In use, the tool is slipped over the flange and the pin is inserted as shown. Then a bolt is passed through one of the holes in the handle and a flange hole, to provide a fulcrum. Considerable leverage can be obtained with this handle.

Brine Used for Pre-Dipping Metal Heated in Lead Bath

When heat-treating metals by the lead-bath method, a mixture of alcohol and whiting, in equal parts, is superior to a solution of water and whiting for pre-dipping the metals. If neither is available, salt-water meat-pickling brine is a good substitute. The brine will form a white film which prevents the lead from adhering to the work.

Pasteboard Box Filled with Dirt Serves as Warning Sign

An ordinary pasteboard box, filled with dirt to weight it down, serves as a good temporary sign. The sides are cut and bent over at an angle, a short piece of wood being tacked on to hold them down. The lettering is painted on the vertical side. Easily made, the signs are useful in excavation jobs.



Gout Remedy for Poultry

Although many poultry owners do not know it, chickens are subject to gout. The symptoms are lameness and weakness in the knee joints, the cause, of course, being too rich food. Separate the sick birds from the rest of the flock, and give them Epsom salts in their drinking water, at the rate of 1 lb. to 3 gal. of drinking water for every 100 birds. Also reduce the meat scraps and similar food, and give them more greens.



Getting the Most out of your Lawnmower

THERE are a few simple adjustments that will greatly improve the operation of a lawnmower. If it runs hard, the chances are that it needs a good cleaning. Thick grease and dried grass work into the teeth of the gears causing them to bind. In order to clean out the gears the drivewheels must be removed. On most mowers this can be done by means of a screwdriver and a wrench, if the nut on the inner side turns. (See Fig. 1.) After removing the wheels, flush the interior with kerosene and clean out each individual tooth of the gear. The pinion housing should be removed next. This will allow the pinion gear to be slipped off the shaft as shown in Fig. 2. Inside of the pinion, there is a hardened steel pawl of some kind, which engages the wheel on the forward motion, but allows it to turn freely when reversed. The ends of the pawl have a bevel on one side, and its exact position should be carefully noted so that no mistake will be made when replacing it. Fig. 3 shows details of the pinion and pawl. Now clean the housing, pinion and pawl with kerosene and repack with cup grease, after which the mower is reassembled and lubricated thoroughly with a medium grade of the best machine oil.

When a mower is dull or out of adjustment, it will leave ridges of uncut grass as shown in Fig. 5. If this is your trouble, the mower needs more

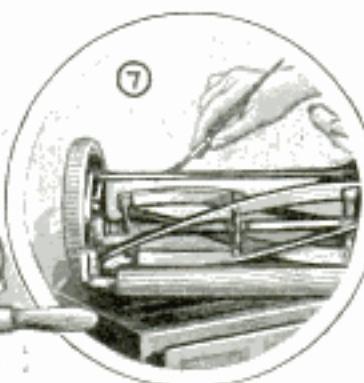


than cleaning and re-oiling. First examine the bearings of the spindle carrying the rotating cutters to determine if there is excessive play. These bearings can usually be taken up by means of a setscrew or similar device. Only enough play should be allowed to permit the spindle to turn freely. It will probably be necessary to adjust the stationary blade after the spindle bearings have been taken up, or perhaps the former adjustment alone is needed. On most mowers, the raising





Wedges between Handle and Crossbar Cure Loose-ness at This Point



and lowering of the stationary blade is accomplished by means of two adjusting screws on each end of the mower frame. Fig. 4 shows how this is done, while the pivot and relative position of the blade are shown in Fig. 3. First lower the forward screws about a quarter turn, then drive down the back ones, those nearest the wooden roller, an equal amount to raise the blade, after which the blade is locked in position by tightening the screws first loosened. To lower the blade, the process is reversed. The clearance between the stationary and revolving cutters should be very slight.

If the cutters are dull, they can usually be sharpened by simply reversing the pawls so that the blades of the mower will run backward. Coarse valve-grinding compound is spread on the stationary cutter and the mower is pulled backward over the floor until the cutters are sharp. If your mower cannot be reversed, the knives may be touched up a bit with a file, but great care is needed to avoid filing them uneven. If the blades are badly

worn and nicked, or so hard that the file will not cut them, the sharpening job should be left to a professional, who uses a machine especially designed for the purpose.

As rust is the greatest enemy of a lawnmower, you should not neglect to provide what protection you may against it. A coat of aluminum or bronze paint applied with a small brush, as in Fig. 7, once a season will add years to the life of a mower. Adjustment of the wooden roller determines how close the grass will be cut. To have the grass quite long, lower the roller, and to cut it off short, raise the roller. Leaving the grass about 1 in. long is recommended. Handles are easy to tighten by drawing up the bolts. If the crossbar is loose, drive a hardwood wedge at one or both ends of the tenon, as shown in Fig. 6. The bolt through the tenon is then tightened. In the absence of such a bolt one can readily be provided.

Care and Uses of Handscrews

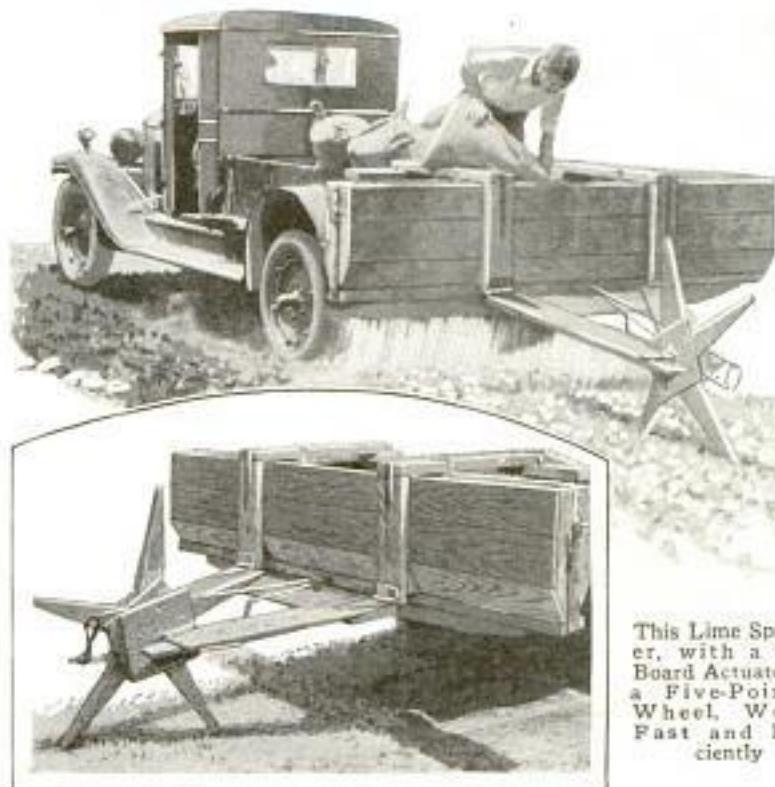
When new handscrews are received, care should be taken to see that they are in the best of working order. The threaded spindles should work freely and when they are to be used around glue, they should be dipped in linseed or thin lubricating oil, and then in hot beef tallow. This prevents the glue from adhering to them. The wooden parts, including the handles, can be better protected by an occasional coat of shellac. On some of the later types, the threaded bars work in swiveled members, which allows the clamping also of tapered and offset work. Glue will not adhere to bars of this type. Besides the regular function of clamping material, two handscrews can be used as a vise or for holding small parts for grinding.

For Your Workshop

An attractive 16 by 23-in. table giving both the decimal and metric equivalents of the fractional parts of an inch, for use in the home workshop as well as the drafting room, machine shop, garage, etc., will be sent to anyone upon receipt of 10 cents to cover mailing costs. Address Book Dept., Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

A Vibrating Hopper for Liming Farm Soil

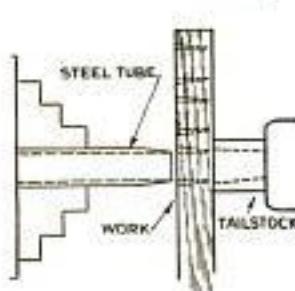
For spreading lime on his fields, any farmer can quickly improvise this spreader, which was designed, built and tested by the department of agriculture. The box is made of 2-in. lumber and is securely bolted to the endgate of a truck. The lower edges of the sides are brought together at a sharp angle and the bottom, or slip board, is hung onto the ends with lengths of flat iron, a slot being cut in each hanger to fit a lag screw, which holds it in place, but allows slight vertical movement to increase and decrease the separation between the sides and bottom. Hinged to the box are two extension pieces which hold a shaft on which a five-pointed wheel, 3 ft. in diameter, is mounted. A length of rope and a stout spring link the wheel to the slip board so that, when the points of the wheel strike the ground,



This Lime Spreader, with a Slip Board Actuated by a Five-Pointed Wheel, Works Fast and Efficiently

the jar pulls the rope and opens the slip board, allowing lime to fall out uniformly on the ground. One man drives the truck while the other empties the lime into the spreader as it is needed.

Wooden Plugs Cut on a Lathe



Wooden plugs with the grain running crosswise, which are often used for filling counterbores and screw holes, can be cut on a lathe with the aid of a short piece of pipe, the

inside diameter of which is slightly larger than the hole to be plugged. One end of the pipe is tapered to a sharp edge and placed in a chuck. The lathe is run at its greatest speed, and the work is pressed against the cutter by means of the tailstock. The plugs are then pried out of the board and glued into the holes. By carefully matching the grain of the plugs with that of the surface around the holes, they will be hardly noticeable. If the

plugs are to be made on a production basis, the cutter should be bored out on a lathe and hardened.

Spring-Shackle Bolts on Model-A Ford Easily Removed

The difficulty often encountered in removing and replacing the shackle bolts in a model-A Ford spring, when taking out the rear-axle assembly, can be overcome by using an old driveshaft of suitable length. It is bent to clear the differential housing and placed between the ends of the spring before the rear end of the car is raised. As soon as the weight is taken off the spring, the shaft will keep it spread in its natural position.



all 94

Pleasing Version of the Spanish Bungalow



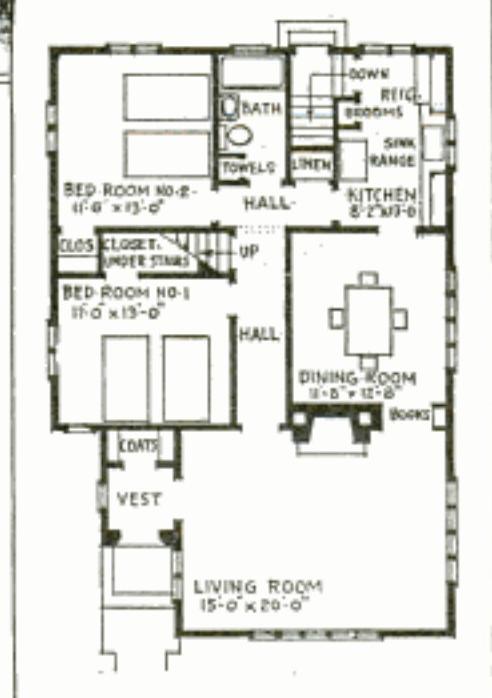
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Plan 5-A-78

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Well lighted by windows so as to be flooded with light during the entire day, the rooms are all of generous size. The center hall, although somewhat long, fully justifies the space it requires, for not only does it afford convenient circulation between rooms, but also privacy to both sleeping and living quarters. The day has passed when we are content to have our bedrooms open directly into living room and dining room where the house is all one floor. Both bedrooms are double rooms, and both have commodious closets.

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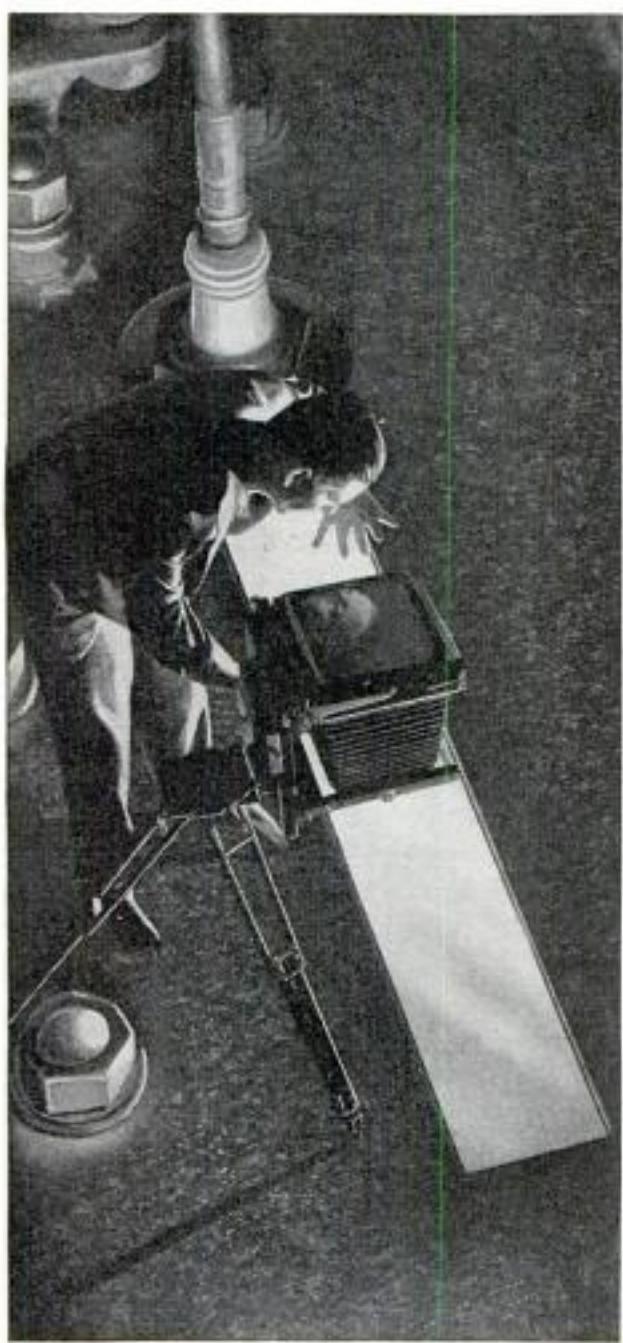


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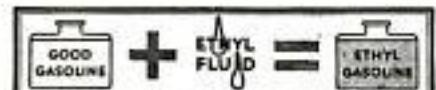
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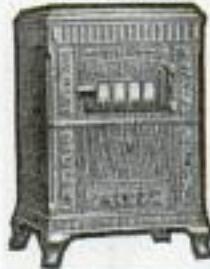
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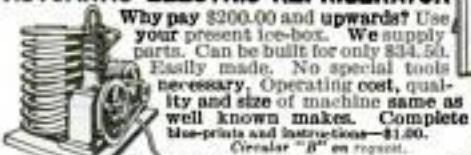
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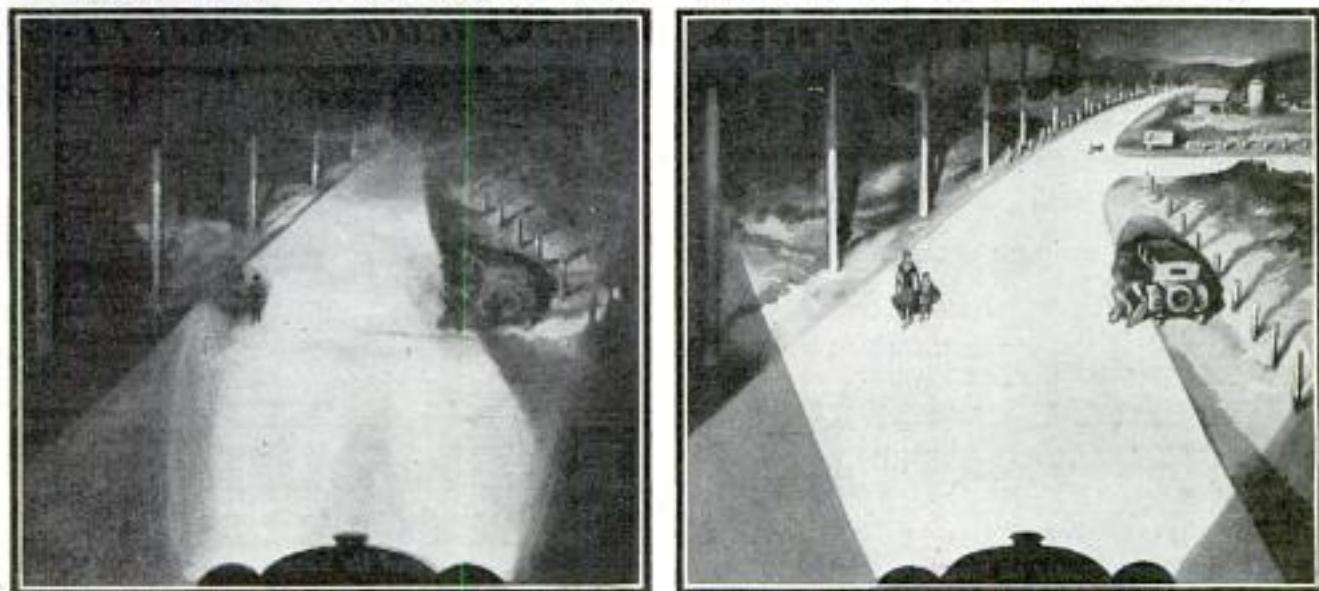


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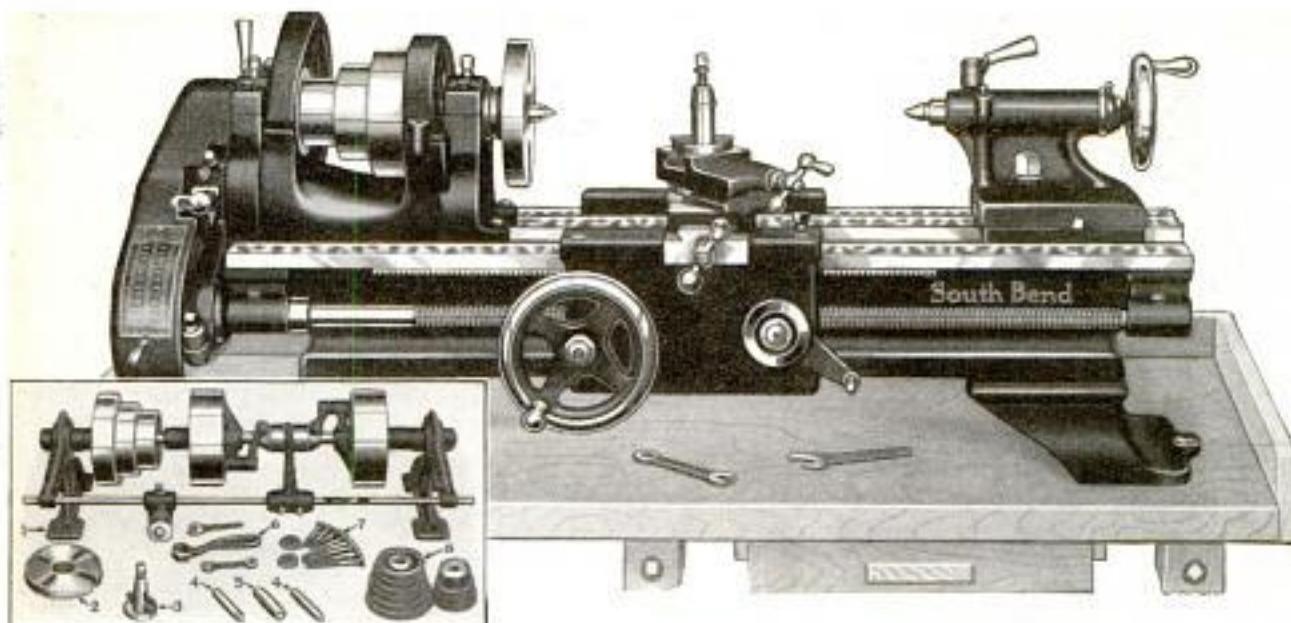
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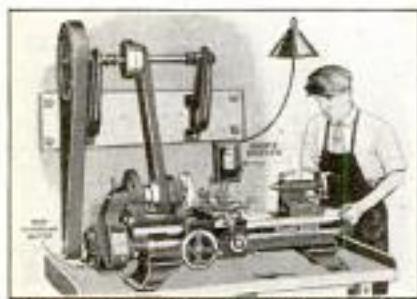
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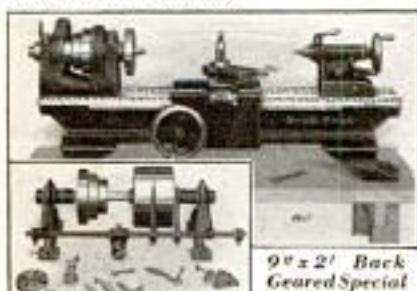


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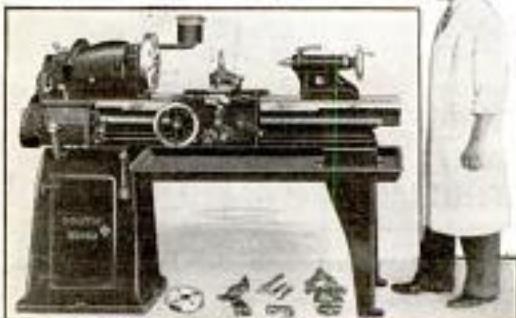


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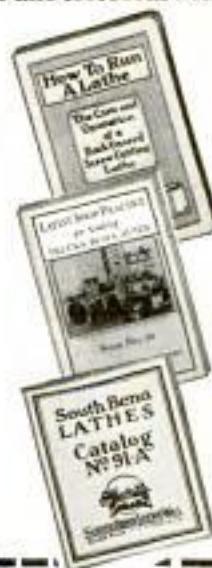
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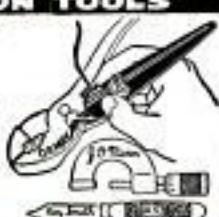
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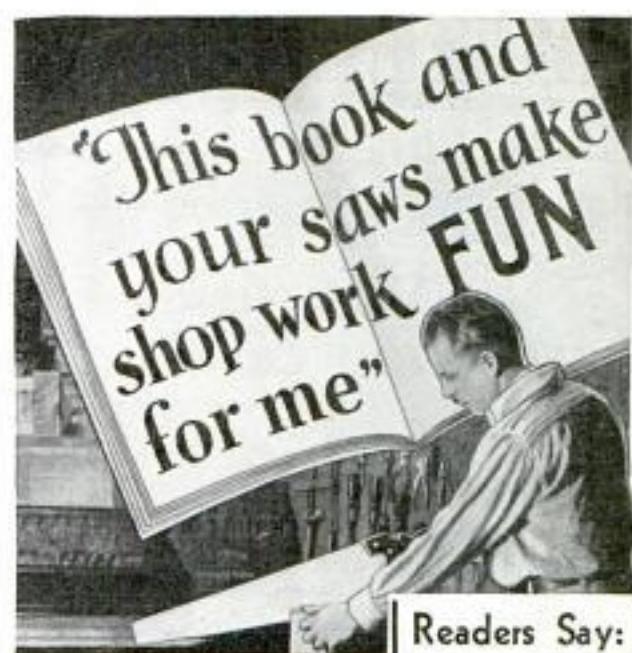
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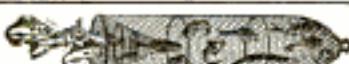


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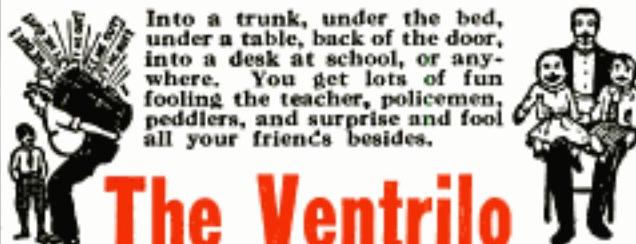
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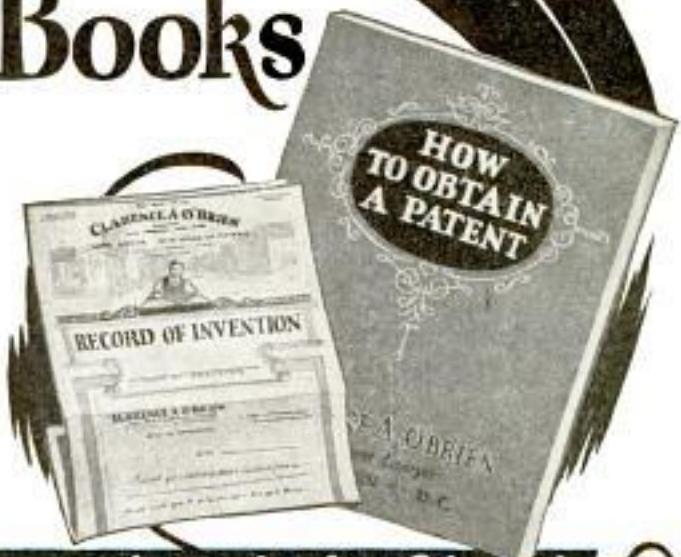
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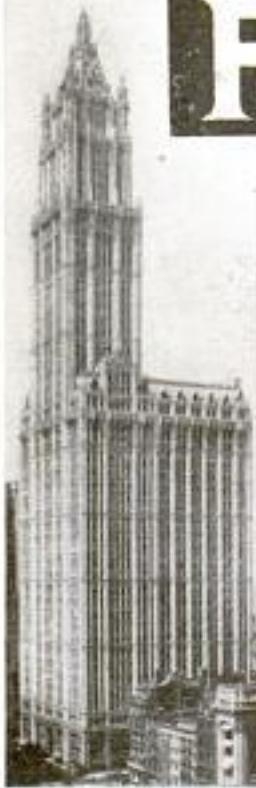
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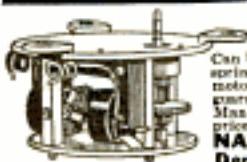


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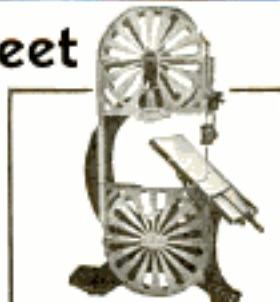
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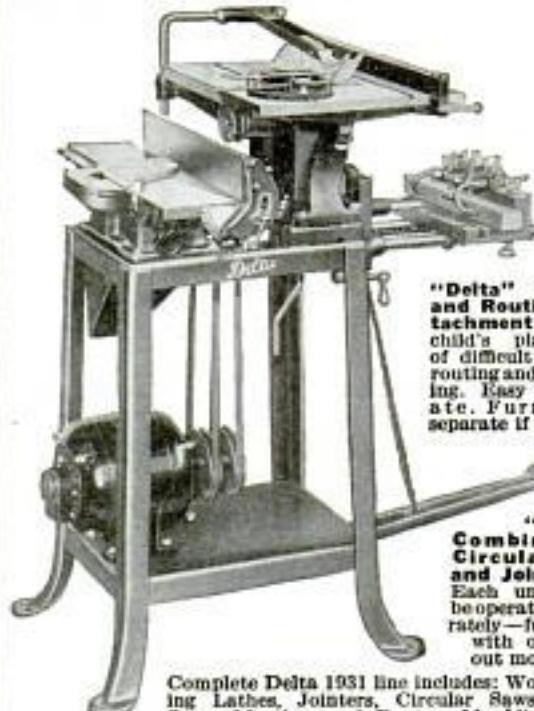
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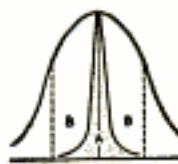
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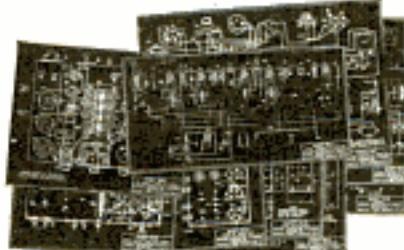
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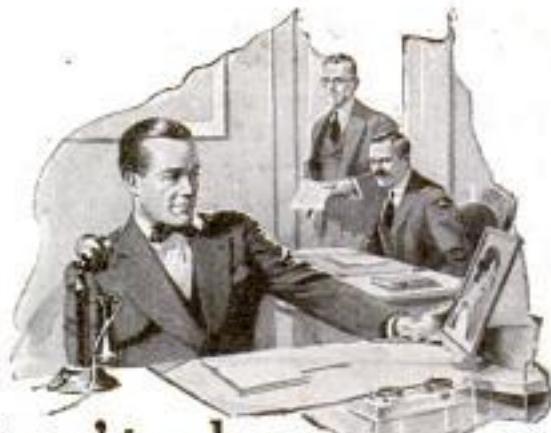
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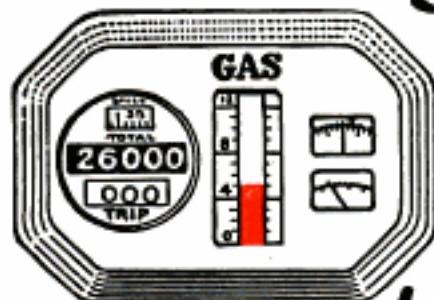
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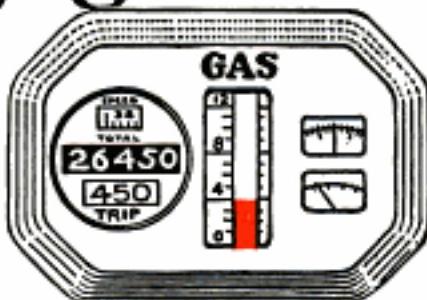
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Amazing Whirlwind Device Saving Millions of Gallons of Gas for Auto Owners

The Whirlwind Carbureting device embodies scientific features which conserves part of the gasoline that formerly went to waste.

Letters coming into the office tell of record mileages resulting in amazing gas savings. Low gasoline mileage is reported on practically every make of car. Greater power and smoother running motors are also noticed by users. The cost of the Whirlwind is so little that, basing its gas saving features even on the most modest reports, it would pay for itself almost immediately and then save many, many dollars for its owner by reducing gasoline consumption.

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN and DISTRIBUTORS WANTED To Make Up To \$100.00 a Week and More

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

WHIRLWIND MANUFACTURING CO.
Dept. 686-A, Station C. Milwaukee, Wis.

GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

FREE OFFER COUPON

WHIRLWIND MANUFACTURING CO.,
Dept. 686-A, Station C, Milwaukee, Wis.

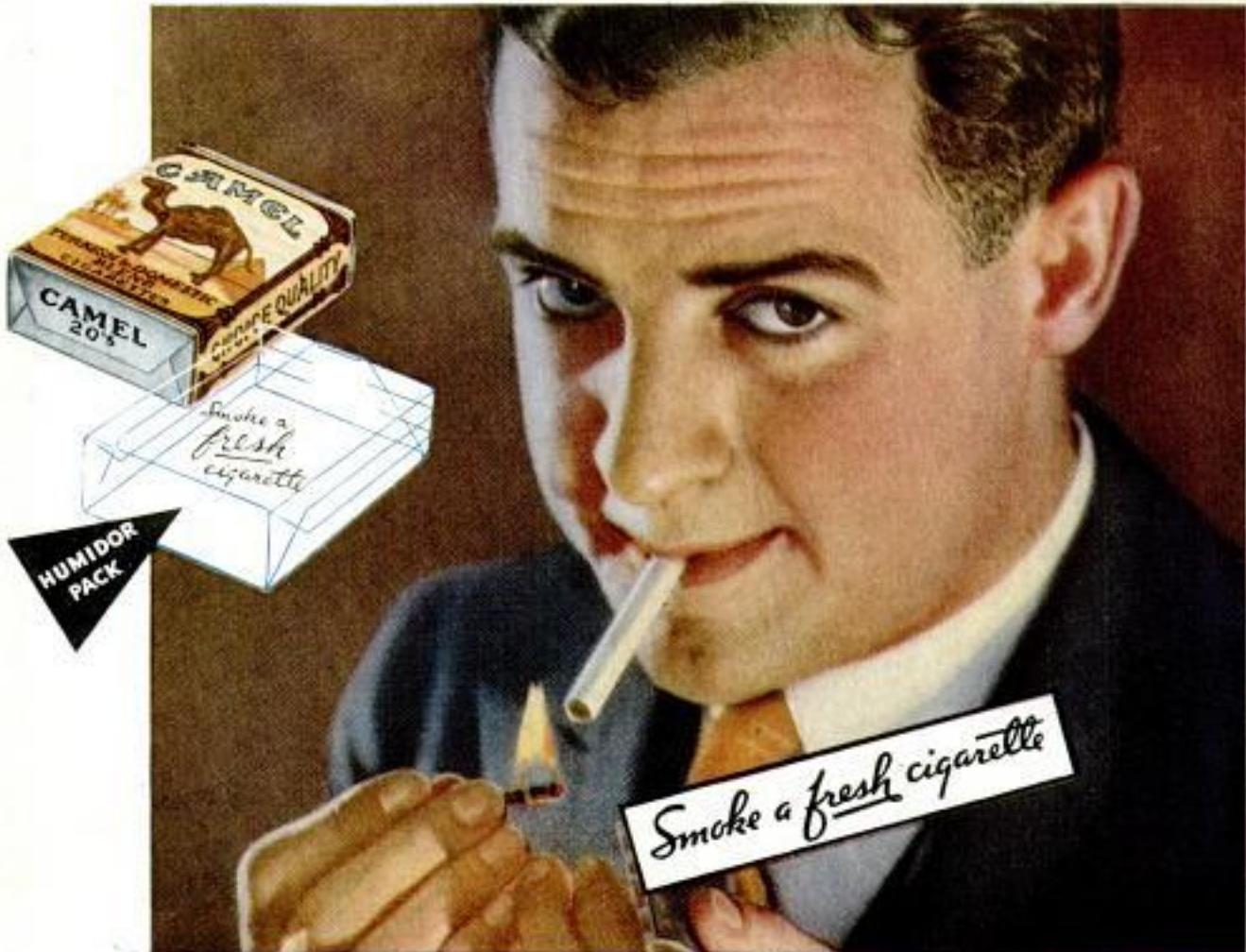
Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one free. This does not obligate me in any way whatever.

Name.....

Address.....

City..... State.....

() Check here if you are interested in full or part time salesmen position.



To smokers who are HARD-TO-CONVINCE

We like nothing better than to induce a hard-to-convince smoker to switch to Camels for just one day.

For we know that after he has made a real test, it will be mighty hard to lure him away from this famous brand. It's not easy to smoke parched-dry cigarettes once you have known the delights of perfectly conditioned Camels.

After inhaling the cool, soft fragrance of the Camel blend of choice Turkish and mellow Domestic tobaccos protected by the Humidor Pack, your throat protests against the bite and sting and harsh hotness that comes from crumbly, dry tobacco.

No matter where you pick them up, in any land, in any climate, Camels are the same fresh, factory-prime cigarettes.

For the Humidor Pack of moisture-proof Cellophane air-seals all the flavor in and keeps out weather, dust and germs.

This is no mere advertising story. It is a recitation of fact that has made the whole country conscious of a new superiority in Camels.

If you are hard to convince, won't you switch to Camels for just one day? Then leave them — if you can.

- Don't remove the moisture-proof Cellophane from your package of Camels after you open it. The Humidor Pack is protection against sweat, dust and germs. It delivers fresh Camels and keeps them right until you smoke the last one.

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CAMELS

NO CIGARETTE AFTER-TASTE